Appendix A

UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF TEXAS

SAN ANTONIO DIVISION

WAVE NEUROSCIENCE, INC. a Delaware Corporation, Plaintiff, vs. BRAIN FREQUENCY LLC, a Texas Limited Liability Company Defendant.	Case No. 5:23-CV-00626-XR Honorable: Xavier Rodriguez

APPENDIX A – PLAINTIFF'S EXCERPTED INTRINSIC EVIDENCE

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I. [A method of] improving a physiological condition or a neuropsychiatric condition (Claim Number 10)

Transcranial magnetic stimulation and rTMS have been used to treat many psychological and medical disorders such as major depressive disorder, Parkinson's disease, Alzheimer's disease, autism spectrum disorder (ASD), schizophrenia and others. '111 Patent, 1:24-28.

An improvement in a physiological condition, psychological condition, or a neuropsychiatric condition exhibited by the mammal is achieved. '111 Patent 1:41-44.

By modulating the brain activity of a mammal, improvements in physical conditions, psychological conditions, and neuropsychiatric conditions are improved in a non-invasive manner and usually without the need for medications. '111 Patent, 1:59-62.

Neuropsychiatric conditions that can be improved include symptoms of Autism Spectrum Disorder (ASD), Alzheimer's disease, attention deficit hyperactivity disorder (ADHD), schizophrenia, anxiety, depression, coma, Parkinson's disease, substance abuse, bipolar disorder, a sleep disorder, an eating disorder, tinnitus, traumatic brain injury, post traumatic stress disorder (PTSD), or fibromyalgia. '111 Patent, 2:1-8.

Patients with various mental disorders are often found to have frequency "decoupling" between critical organs, such as heart and brain. '111 Patent, 3:22-24.

Delta waves are normally prevalent in infants, during slow wave sleep or during continuous attention tasks in adults. In pathological conditions, it is often associated with metabolic encephalopathy or other types diffused brain lesions. '111 Patent, 3:52-56.

Theta band intrinsic frequency (4-8 Hz). Theta waves are commonly found in children and during periods of drowsiness in adults. It is also associated with inhibition of elicited responses. It has been observed in pathological conditions such as focal subcortical lesions, metabolic encephalopathy, and deep midline disorders. '111 Patent, 3:59-65.

Alpha band is normally found during periods of relaxation while closing the eyes. Physiologically it is associated with the process of inhibition control. Lack of alpha activity is found in autism, and other mental disorders, such as anxiety, schizophrenia, and ADHD. Reduced alpha frequency coherence has been found in patients with Alzheimer's disease. Excessive alpha activity may be seen in comatose conditions. In general, rTMS in this range will help treat autism, reduce anxiety, increase attention, or treat schizophrenia and Alzheimer's. '111 Patent, 4:1-11.

Beta band is associated with alertness, busy or anxious thinking. Significant reduction of beta activity is often found in subjects treated with benzodiazepines. rTMS in this range will help to increase alertness. '111 Patent, 4:13-17.

Gamma activity displays during cross-modal sensory processing or short term memory matching of recognized objects, sounds, or tactile sensations. A decrease in gamma band activity may be associated with cognitive decline, such as Alzheimer's disease. rTMS in this range is used to treat

cognitive deficits in Alzheimer's disease or other forms of dementia. '111 Patent, 4:18-26.

Mu rhythm has frequency overlap with alpha wave but, instead of parietal occipital regions, it is only seen in the sensory motor cortex. It reflects the synchronous firing of motor neurons in rest state. Mu suppression is thought to reflect motor mirror neuron systems. Deficits in Mu suppression, and thus in motor neurons, play a role in autism. rTMS in the frequency band at the specific location will help normalize the mirror neurons to treat autism. '111 Patent, 4:27-35.

Single-lead ECG showed a regular heartbeat at 1.5 Hz. Taking its 6th higher harmonic, it was decided to set the rTMS at 9.0 Hz over the mid-central and left frontal lobe. Following the first 2 sessions of rTMS, the patient showed some degree of improvement with more vigilance and spontaneous communication. With further treatments there was a significant reduction of the slow waves in the patient's EEG and an increase in alpha rhythm. Clinically, the frequency of seizure episodes reduced significantly. After titrating down the anticonvulsant dosage over time, the patient experienced a significant improvement in cognitive and motor functions. '111 Patent, 7:1-12.

Single-lead ECG showed a regular heartbeat at 1 Hz. Taking its 9th higher harmonic, it was decided to set the rTMS at 9 Hz over the bilateral pre-frontal lobe. Following 3 sessions of rTMS, the patient showed a significant reduction in pain. The EEG pattern showed significant improvement in alpha synchronization. '111 Patent, 7:21-26.

An adult female (85 years old) had been diagnosed with Alzheimer's disease for about 15 years. The patient's EEG showed alpha peak frequency below 8 Hz which is in the theta band range. Single-lead ECG showed a regular heartbeat at 1.2 Hz. Taking its 7th higher harmonic, it was decided to set the rTMS at 8.4 Hz over the bilateral pre-frontal lobe. Following 1 session of rTMS, the patient showed a significant improvement in short term memory and working memory. After 2 weeks of daily (Monday-Friday) rTMS sessions the patient became more coherent and her MMSE score improved from 14 pre-treatment to 21 post treatment. The EEG pattern showed an alpha wave near 8 Hz. '111 Patent, 7:35-43.

"The claims of the present application could be infringed without *literally infringing* the claims of the '385 patent. For example, the present claims recite methods of "improving a physiological condition or a neuropsychiatric condition," whereas the '3 85 patent claims a method of "modulating a brain activity" that achieves the result of improvement in a particular physiological condition or a neuropsychiatric condition. Furthermore, the claims of the '385 patent recite subjecting the mammal to rTMS "for a time sufficient to modulate said brain activity," whereas the present claims-which do not recite that the means of improving a physiological condition or a neuropsychiatric condition include modulating brain activity-do not recite such a time limitation." '111 Prosecution History at *90 (March 20, 2017, Amendment under 37 CFR §1.111, p. 5).

"The claims of the '385 patent could be infringed without *literally infringing* the claims of the present application. For example, the '385 patent claims are directed towards "modulating the brain activity of a mammal," whereas the present claims are directed towards improving the symptoms or conditions of a human. Thus, for example, application of the claimed methods to a

dog would infringe the claims of the '385 patent but would not literally infringe the claims in the present application." '111 Prosecution History at *67-68 (December 27, 2017, Amendment under 37 CFR §1.114, p. 5-6).

II. A frequency that decreases blood flow in a lower region of the brain of the subject (Claim Number 22)

"…wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject." '737 Patent 18:16-18.

"Increased neuronal activity in a region of the brain is associated with an increase in blood flow, and hence a higher rate of oxygenated/deoxygenated hemoglobin as measured by Blood Oxygenation Level Detection (BOLD). In Major Depressive Dissorder ("MDD" and/or shortened herein in some embodiments as "depression"), there is a significant decrease in blood flow, and therefore a decrease in metabolic activity in the cortex. In some embodiments, the blood flow increase (and or increase in metabolic activity) is in the frontal cortex. This can be shown in studies using SPECT and PET scans. The lower the blood flow to the cortex, the greater the severity of the depression. This decreased blood flow becomes more significant for subjects with increased cognitive impairment associated with their depression. The decrease in regional cerebral blood flow (rCBF) is particularly evident in the prefrontal cortex and cingulated gyms. Studies of correlations between rCBF and symptom severity in MDD show a decrease in metabolism in the amygdale, lentiform nucleus, parahippocampal gyms, and an increase in metabolism in the postero-lateral parietal cortex. Other studies have shown an increase in blood flow in the lower regions of the brain during MDD, such as the cerebellum and amygdala for depressed subjects. The metabolism of a region of the brain can be related to the energy consumed by that region. An area of high metabolism may be considered an area of high energy or high activity. Likewise, an area of low metabolism may be considered an area of low energy." '737 Patent 30:62-31:21.

"Provided herein is a method comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject. Provided herein is a method comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected Q-factor; and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that decreases blood flow in a parietal-occipital region of the brain of the subject. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate gyms, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia." '737 Patent, 31:49-65.

"Parallel to the rCBF studies, EEG studies have shown that MDD subjects have higher alpha band activities. The alpha band is a dominant EEG component with frequency ranged between 8 Hz and 13 Hz. A negative correlation has been shown between alpha power and the rCBF in the cortex where the alpha was measured. This suggests that a high alpha power is indicative of low rCBF, and therefore a low metabolism (and energy), in the region of cortex where the EEG was recorded. A number of studies have shown this excessive EEG alpha power, which may be a result of neural activity being overly synchronous. By applying a low magnitude alternating magnetic field, activity becomes less synchronous and EEG alpha power decreases. These changes correlate with improvement in clinical symptoms." '737 Patent, 33:32-45.

"The regional Cerebral Blood Flow (rCBF) of subjects enrolled at the US study site was evaluated using a SPECT scan at baseline and again after the 4 weeks of treatment. A significant

correlation between changes in rCBF and HAMD-17 score was found, specifically in the orbital frontal cortex (r=−0.67, P=0.04), prefrontal tip (r=−0.66, P=0.05), and dorsal lateral prefrontal cortex (r=−0.55, P=0.12). See Table 5 showing the correlation between Changes in rCBF (%) and HAMD Score (%). Areas of increased activation of the active NEST device compared to sham were observed, along with areas of deactivation of the active NEST device compared to SHAM. Areas of the cortex were observed to be activated by NEST device treatment compared to SHAM. Areas of the cortex were observed to be deactivated by NEST device compared to SHAM. A significant portion of the cortex was shown to have increased blood flow for the active subjects (using the NEST device) compared to sham. Much of this activation occurs in the prefrontal cortex. Using the therapy, activation of the cortex occurs, especially in the frontal region, whereas deactivation occurs in the rear and lower regions of the brain." '737 Patent, 77:28-48.

"FIG. 41 shows the results of a clinical trial utilizing the NEST device for the treatment of anxiety. This trial involved two (2) patients (subjects). Both patients received treatment with the NEST device as shown in FIG. 19, with permanent magnets arranged as shown in FIG. 16. In the method used for these patients, a magnetic field was adjusted to influence the Q-factor of an intrinsic frequency of each subject within the alpha-band. The magnetic field was applied close to the head of the subject. EEG readings were taken before treatment began. A Cadwell Easy 2.1 EEG system was used to take a 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. Both patients were treated with a constant frequency, wherein for each patient the NEST was set to rotate the magnets at the intrinsic frequency detected for that patient. Patients received treatment every weekday for 30 days. EEG readings were taken after treatment at least on a weekly basis. The first data point is the baseline HAMA score. The second data point for each line represents the HAMA score after one (1) week of treatment for each patient. The third data point for each line represents the HAMA score after two (2) weeks of treatment for each patient. The fourth data point for each line represents the HAMA score after four (4) weeks of treatment for each patient." '737 Patent, 78:10-33.

"With respect to Claims 1 and 2, as amended, Katz fails to teach or suggest **moving** "an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band" and with respect to Claim 1, Katz further fails to teach or suggest **moving** "a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a preselected Q-factor." Additionally, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject" or that "the preselected Q-factor is a Q-factor that increases blood flow in the cortex of the subject" as required in Claim 1. Similarly, with respect to Claim 2, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject."" '737 Prosecution History at *1308 (February 13, 2014 Amendment in Response to Non-Final Office Action, p. 6).

"Further, Claim 1 of the present invention recites adjusting output of a magnetic field and moving the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band, wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***" '737 Prosecution History at *1308 (February 13, 2014 Amendment in Response to Non-Final Office Action, p. 6).

III. A Q-Factor that increases blood flow in the cortex of the subject (Claim Term 23)

"Provided herein is a method comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. Provided herein is a method comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject. Provided herein is a method comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the dorsal and frontal regions of the cortex of the subject. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex." '737 Patent, 31:22-48.

"Parallel to the rCBF studies, EEG studies have shown that MDD subjects have higher alpha band activities. The alpha band is a dominant EEG component with frequency ranged between 8 Hz and 13 Hz. A negative correlation has been shown between alpha power and the rCBF in the cortex where the alpha was measured. This suggests that a high alpha power is indicative of low rCBF, and therefore a low metabolism (and energy), in the region of cortex where the EEG was recorded. A number of studies have shown this excessive EEG alpha power, which may be a result of neural activity being overly synchronous. By applying a low magnitude alternating magnetic field, activity becomes less synchronous and EEG alpha power decreases. These changes correlate with improvement in clinical symptoms." '737 Patent, 33:32-45.

"The power of the alpha band relative to other bands is generally higher for patients with MDD. Since the overall metabolism of the brain is generally constant, the increase in alpha power will result in a higher alpha Q-factor, which indicates a lower metabolism, and energy, of the cortex. Patients with MDD usually have lower metabolism in the cortex, especially in the frontal regions, therefore the Q-factor of alpha EEG in those regions will be high, indicative of a low-energy system. FIG. 37 shows a general relationship between the measures of neural activity in the cortex (frontal cortex) and a possible indication for Major Depressive Disorder (MDD)." '737 Patent, 35:8-20.

"Lowering the Q-factor of patients with MDD may improve MDD symptoms in some patients. The methods and devices provided herein can lower the Q-factor of a subject." '737 Patent, 35:21-23.

"The brain is a non-linear resonant system. To increase the resonance, and thereby the Q-factor of the system, an alternating magnetic field may be applied that matches the alpha frequency. To decrease the resonance and lower the Q-factor, an alternating magnetic field is applied that is slightly off the alpha frequency. Since the brain is a resonant system, the magnetic field does not need to be large. It is not necessary, in some embodiments, to actively cause current to flow in the brain." '737 Patent, 35:24-32.

"The low energy sinusoidal alternating magnetic field creates a low voltage alternating electric field in the tissue, but any current created directly is negligible. The methods and devices provided herein, in some embodiments, "encourage" firing at the magnetic field frequency by causing the baseline potential across the neuron to vary slightly in time with the electric field.

The variation of the potential can be subthreshold, which will not induce any neuronal firing. In some embodiments, if the magnetic field frequency matches the alpha frequency of a region of cortex, the Q-factor of that region will increase. If it does not match, in some embodiments, the Q-factor will decrease." '737 Patent, 35:34-45.

"If the brain was a linear resonator, one would be unable to change the Q-factor simply by applying an external magnetic field. Once the magnetic field was turned off, it might be expected that the brain to return to its original state. Instead, however, as shown in examples mentioned herein using the methods and devices provided herein, the brain adjusts its Q-factor a small amount due to the applied magnetic field, and that adjustment is additive as therapy progresses." '737 Patent, 35:56-63.

"Application of a low energy alternating magnetic field near the head of a patient suffering from MDD (i.e., the patient has a high Q-factor) with the magnetic field frequency equal to the average alpha frequency should result in a decrease in the patient's Q-factor. The decrease in Q-factor causes the cortex to be higher energy, which causes a decrease in the symptoms of MDD." '737 Patent, 35:64-36:3.

"In this study, a large, statistically significant decrease in HAMD score was observed in subjects treated with the NEST device. This improvement in symptoms of depression was accompanied by a significant decrease in Q-factor in the cortex. In addition, in subjects treated with the active NEST device, there was an increase in blood flow, and therefore an increase in metabolism in the cortex, particularly in the prefrontal region, the area of the brain associated with mood. FIG. 42 shows how the increase in rCBF in orbital frontal cortex predicts clinical improvement in depression ($r=-0.67$, $P=0.04$). This figure shows that as the blood flow in the orbital frontal cortex is increased, the HAMD score decreases." '737 Patent, 77:62-78:6.

"With respect to Claims 1 and 2, as amended, Katz fails to teach or suggest **moving** "an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band" and with respect to Claim 1, Katz further fails to teach or suggest **moving** "a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a preselected Q-factor." Additionally, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject" or that "the preselected Q-factor is a Q-factor that increases blood flow in the cortex of the subject" as required in Claim 1. Similarly, with respect to Claim 2, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject."" '737 Prosecution History at *1308 (February 13, 2014 Amendment in Response to Non-Final Office Action, p. 6).

"Further, Claim 1 of the present invention recites adjusting output of a magnetic field and moving the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band, wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***" '737 Prosecution History at *1308 (February 13, 2014 Amendment in Response to Non-Final Office Action, p. 6).

IV. Adjusting [a setting]…/[frequency]/[output] (Claim Number 24)

In some embodiments of at least one aspect described above, the methods further comprise the step of measuring EEG data of the subject after the applying step. In some embodiments, further comprising the steps of:

(a) adjusting frequency of said magnetic field based on the EEG data of the subject; and

(b) repeating the applying step with an adjusted frequency. ’408 Patent 5:47-54. *See also* ’737 Patent 2:63-3:1.

In some embodiments of at least one aspect described above, the methods or devices use a Transcranial Magnetic Stimulation (TMS) device.

Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing an intrinsic frequency of an EEG band of a subject toward a target frequency of the EEG band; and applying said output current across a head of the subject.
In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to the target frequency.

Provided herein is a method comprising determining the intrinsic frequency of the EEG band of the subject; and comparing the intrinsic frequency to the target frequency of the EEG band, wherein the target frequency is an average intrinsic frequency of the EEG band of a control group, wherein if the intrinsic frequency is higher than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject, and if the intrinsic frequency is lower than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, or Parkinson's disease).

Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing a Q-factor of an intrinsic frequency of an EEG band of a subject toward a target Q-factor; and applying said output current across a head of the subject.
In some embodiments, the step of adjusting the output current comprises varying a frequency of the output current. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject.
In some embodiments, the step of adjusting the output current comprises setting the output current to the target frequency.

In some embodiments, the method further comprises determining the Q-factor of the intrinsic frequency of the EEG band of the subject; and comparing the Q-factor to the target Q-factor, wherein the target Q-factor is an average Q-factor of the intrinsic frequencies of the EEG band of a control group, wherein if the Q-factor of the intrinsic frequency is higher than the target Q-factor, the step of adjusting the output current comprises varying a frequency of the output current, and if the Q-factor of the intrinsic frequency is lower than the target Q-factor, the step of adjusting the output current comprises setting the output current to a frequency that is the intrinsic frequency of the subject. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, or Parkinson's disease).'408 Patent 10:63-11:60. *See also* '737 Patent 14:42-15:20.

FIG. 7 shows an exemplary embodiment of the pMERT or NEST device. In this embodiment, a button EEG electrode is located on the concave surface of the device and a second reference electrode extends via a wire from the side of the device. The display and control buttons are located on top of the device to provide information and allow the user to adjust parameters and enter patient data. A USB port is located at the top rear of the device, to allow it to be connected via a USB cable to a PC, allowing uploading of data and downloading of a dosage quota. '408 Patent 15:24-33. *See also* '737 Patent 20:4-14.

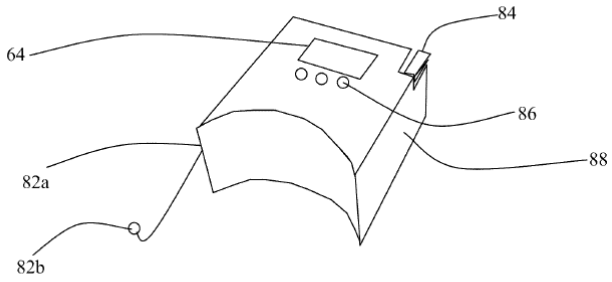

Figure 7

As used herein, "coma" means a neurological disorder characterized by a profound state of unconsciousness. Subjects in a comatose state (i.e., in a coma) do not have sleep-wake cycles, cannot be awakened, fail to respond to stimuli (e.g., pain or light), and do not take voluntary actions. In certain instances, a subject will emerge from a coma in varying levels of consciousness (e.g., vegetative to fully conscious). In some embodiments, stimulating the area of the brain responsible for arousal results (partially or fully) in a subject emerging from a coma. In some embodiments, a subject in a coma displays slow sinusoidal brain waves. In some embodiments, stimulating a subject's brain waves at their alpha frequency results in the subject emerging from a coma. In some embodiments, stimulating a subject's brain waves at or near their alpha frequency results in the subject emerging from a coma. In some embodiments, stimulating a subject's brain waves at 9.6 Hz results in the subject emerging from a coma. In some embodiments, as the subject regains consciousness, the frequency used to stimulate the subject's brain waves is adjusted. In some embodiments, as the subject regains consciousness, the frequency used to stimulate the subject's brain waves is adjusted to a frequency closer to their

alpha frequency. As used herein, "alpha frequency" means a type of brain wave predominantly found to originate from the occipital lobe during periods of waking relaxation. In certain instances, alpha waves are attenuated during periods of sleep. '408 Patent 20:57-21:15.

In some embodiments, ceramic magnets, electromagnets or other more powerful magnets may be utilized as they become available. In some embodiments, electromagnets may be utilized for the methods and devices described. Current can be supplied to the electromagnet by wires penetrating through the devices described and connecting to an external power source. '408 Patent 31:12-18. *See also* '737 Patent 43:28-34.

Described are magnetic therapeutic devices and methods for magnetic therapies where a brain of a subject is individual to at least one dynamic magnetic field having an amplitude of at least a half waveform. In certain embodiments, the treatment area is exposed to a half waveform of magnetic flux. In other embodiments, the treatment area is exposed to a full waveform of magnetic flux. Still other embodiments may permit treatment area to be exposed to either a half or full waveform. To individual the treatment area to such a dynamic magnetic field, the magnetic source may be rotated, oscillated, moved through a particular pattern, or otherwise moved relative to a head of a subject. The application area of the subject can be positioned relative to the magnetic source so that the magnetic field extends around and/or through the application area. In certain embodiments, the devices described comprise at least one magnet having a north and south magnetic pole and a pole width equal to the width of the magnet at the poles.

Three parameters of magnetic fields generated by the devices described can be manipulated:

(a) the intensity of the magnetic field at the treatment site, which can be determined by the strength of the magnets used and the distance between the magnets and the subject's head;

(b) the frequency of the magnetic field, i.e., the rate of change of the magnetic field, which can be determined by movements of at least one magnet, such as by varying the speed at which at least one magnet moved relative to the application area;

(c) the amplitude of the net change in magnetic flux (or waveform) to which the application area is individualed, and

(d) the phase of the magnetic field between two (or more) magnets (i.e. the magnetic phase) when the magnetic field frequencies of the two (or more) magnets are the same (or substantially the same). '408 Patent 31:19-54. *See also* '737 Patent 43:35-44:2.

Cranial Electrotherapy Stimulation (CES) is a method of applying microcurrent levels of electrical stimulation across the head via transcutaneous electrodes. Provided herein is method including applying an electric alternating current (AC) across a head of a subject, and adjusting and/or varying the frequency of the AC current to effect cognitive performance or a, neurological disorder as described herein. In some embodiments, the AC current is a microcurrent. Provided herein is a method comprising adjusting an output of an electric alternating current source for influencing an intrinsic frequency of a EEG band of a subject toward a target frequency of the EEG band; and applying said electric alternating current across a head of the

subject. In some embodiments of the methods, a CES therapy is used to influence the intrinsic frequency of a patient's brain toward a target frequency as measured by EEG.

Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing an intrinsic frequency of an EEG band of a subject toward a target frequency of the EEG band; and applying said output current across a head of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to the target frequency. In some embodiments, the method further comprises determining the intrinsic frequency of the EEG band of the subject; and comparing the intrinsic frequency to the target frequency of the EEG band, wherein the target frequency is an average intrinsic frequency of the EEG bands of a control group, wherein if the intrinsic frequency is higher than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject, and if the intrinsic frequency is lower than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject.

Provided herein is a method comprising adjusting an output of an electric alternating current source for influencing a Q-factor a measure of frequency selectivity of a specified EEG band of a subject toward a target Q-factor of the band; and applying said electric alternating current across a head of the subject. In some embodiments of the methods, a controlled waveform CES therapy is used to influence a Q-factor of an intrinsic frequency of a patient's brain. FIG. 12 shows an example of the Q-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The Q-factor is defined as the ratio of $f_0/\Delta f$. As can be seen, when ΔF decreases for a given f_0, the Q-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases.

Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing a Q-factor of an intrinsic frequency of an EEG band of a subject toward a target Q-factor; and applying said output current across a head of the subject. In some embodiments, the step of adjusting the output current comprises varying a frequency of the output current. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to the target frequency. In some embodiments, the method further comprises determining the Q-factor of the intrinsic frequency of the EEG band of the subject; and comparing the Q-factor to the target Q-factor, wherein the target Q-factor is an average Q-factor of the intrinsic frequencies of the EEG bands of a control group, wherein if the intrinsic frequency is higher than the target frequency, the step

of adjusting the output current comprises varying a frequency of the output current, and if the intrinsic frequency is lower than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject. '408 Patent 47:6-48:23. *See also*'737 Patent, 59:25-60:44.

FIGS. 7, **8**, and **9** show an exemplary embodiment of the pMERT (NEST) device **88**. In this embodiment, a button EEG electrode **82** *a* is located on the concave surface of the device **88** and a second reference electrode **82** *b* extends via a wire from the side of the device **88**. The display **64** and control buttons **86** (device controls) are located on top of the device **88** to provide information and allow the user to adjust parameters and enter patient data. A USB port **84** (which may also and/or alternatively be at least one of an internet connection port, a power supply, a modem connection, and another type of communications means) is located at the top rear of the device **88**, to allow it to be connected via a USB cable to a PC, allowing uploading of data and downloading of a dosage quota. FIG. 8 shows the pMERT (NEST) device **88** from FIG. 7 in which a subject **6** is lying with his/her head against the concave surface of the device **88**. At least one moving magnet is unseen inside the pMERT (NEST) device **88** in order to deliver therapy to the subject **6**. Moving magnets such as those in configurations described herein may be used in the device **88** shown in FIGS. 7, **8**, and **9**. The subject's head is pressed against the button EEG electrode (not shown), with the second electrode **82** *b* attached to the subject's right ear. FIG. 9 shows an alternate angle of the subject **6** receiving therapy from the pMERT (NEST) device **88** as described in FIG. 7 and/or FIG. 8. '408 Patent 49:46-50:3. *See also* '737 Patent 62:1-25.

FIGS. 31 and 32 show the results of a clinical trial utilizing the NEST device and methods for the treatment of depression as provided herein. A device was used such as shown in FIG. 19, with permanent magnets arranged as shown in FIG. 16. In the method used in this trial, a magnetic field was adjusted to influence the Q-factor of an intrinsic frequency of each individual within the alpha-band. The magnetic field was applied close to the head of the subject. EEG readings were taken before treatment began. A Cadwell Easy 2.1 EEG system was used to take a 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. Patients were placed in one of three groups: constant frequency, random frequency, or sham, with equal probability for each group. Patients received treatment every weekday for 30 days. EEG readings were taken after treatment at least on a weekly basis. If the patient was in the "constant frequency" group, the NEST was set to rotate the magnets at the intrinsic frequency. If the patient was in the "random frequency" group, the NEST was set to rotate the magnets at random frequencies between 6 Hz and 12 Hz, changing frequencies once per second. If the patient was in the "SHAM" group, the magnets in the NEST were replaced with steel cylinders, thereby imparting no magnetic field to a head of the patient. The patients in this group were divided into two subgroups with equal probability, with one group having the cylinders rotated at the intrinsic frequency and the other group having the cylinders rotated at random frequencies as noted above. For this clinical trial sixteen (16) subjects received treatment with the NEST device. Eleven (11) subjects responded to treatment (i.e. the Responders) and five (5) subjects did not respond to treatment (i.e. Non-Responders). Eleven (11) patients received treatment with the SHAM device. '408 Patent 61:47-62:12.

FIG. 33 shows the results of a clinical trial utilizing the NEST device for the treatment of anxiety. This trial involved two (2) patients (subjects). Both patients received treatment with the NEST device as shown in FIG. 19, with permanent magnets arranged as shown in FIG. 16. In the method used for these patients, a magnetic field was adjusted to influence the Q-factor of an intrinsic frequency of each individual within the alpha-band. The magnetic field was applied close to the head of the subject. EEG readings were taken before treatment began. A Cadwell Easy 2.1 EEG system was used to take a 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. Both patients were treated with a constant frequency, wherein for each patient the NEST was set to rotate the magnets at the intrinsic frequency detected for that patient. Patients received treatment every weekday for 30 days. EEG readings were taken after treatment at least on a weekly basis. The first data point is the baseline HAMA score. The second data point for each line represents the HAMA score after one (1) week of treatment for each patient. The third data point for each line represents the HAMA score after two (2) weeks of treatment for each patient. The fourth data point for each line represents the HAMA score after four (4) weeks of treatment for each patient. ’408 Patent 48:43-67.

The effect of the use of a NEST device according to the methods and device descriptions provided herein is tested. Subjects are recruited who have Parkinson's disease with measurable symptoms, and who are willing to consent to the treatment.

The study will be a one-time test to look for improvement. The test is composed of the following:

a. The subject undergoes an examination and quantitative test to determine the extent of the symptoms. This includes a brief video interview in which the subject responds to questions about symptoms.

b. A 2-lead EEG recording is made. This EEG is examined to determine the proper settings for the device.

c. The subject lays with his/her head in the device for 30 minutes while a gentle, low energy, low frequency magnetic field is generated above the scalp.

d. When treatment is complete, an additional EEG recording is made. This is used to compare with the original recording to determine any changes.

e. The subject undergoes a second examination and quantitative test to see if symptoms have improved. This includes a second brief video interview. ’408 Patent 63:5-27.

The effect of the use of a NEST device according to the methods and device descriptions provided herein is tested. Subjects have amblyopia with measurable symptoms, and who are willing to consent to the treatment.

The test is composed of the following:

a. On day 0, the subject undergoes an examination and quantitative tests to determine the extent of the symptoms.

b. On day 0, a 2-lead EEG recording is made. This EEG is examined to determine the proper settings for the device.

c. On days 1-30, the subject lays with his/her head in the device for 30 minutes while a gentle, low energy, low frequency magnetic field is generated above the scalp.

d. After days 7, 14, 21, and 28 an additional EEG recording is made. This is used to compare with the original recording to determine any changes.

e. On days 7, 14, 21, and 28 the subject undergoes a second examination and quantitative tests to see if symptoms have improved. '408 Patent 64:24-42.

(a) adjusting output of a magnetic field to a setting that is operable to do one or more of the following: '408 Patent Prosecution History at *1740.

"In one aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected or target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject." '737 Patent, 1:39-44; *see also* '737 Patent, 23:1-6.

"comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a healthy population data base; if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the healthy population data base, shifting down the intrinsic frequency of the Subject by applying a magnetic field close to a head of the Subject, wherein said magnetic field has a frequency lower than the intrinsic frequency of the subject; and if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the healthy population database, shifting up the intrinsic frequency of the Subject by applying a magnetic field close to a head of the Subject, wherein said magnetic field has a frequency higher than the intrinsic frequency of the Subject." '737 Patent, 2:10-23; *see also* '737 Patent, 23:58-24:3. *See also* '408 Patent 1:49-61.

"Provided herein is a method of using a Transcranial Magnetic Stimulation (TMS) device for influencing an intrinsic frequency of a subject within a specified EEG band, comprising: adjusting output of said TMS device…." '737 Patent, 2:24-27.

"In some embodiments of at least one aspect described above, the applying of the magnetic field is continuous, in that it does not consist of discrete pulses separated by significant sections in which no magnetic field is applied. In some embodiments of at least one aspect described above, the magnetic field is continuously applied. A magnetic field that is continuously applied may alternate between a positive and negative field and include one or more neutral field(s), or alternate between a positive field and a neutral field, or alternate between a negative field and a neutral field, or some other combination of magnetic fields. It is continuous in the sense that it has a repetitive pattern (waveform) of charged fields (whether positive, negative, or a combination thereof) and uncharged fields. In some embodiments of at least one aspect described above, the applying of the magnetic field applies the magnetic field to a diffused area in a brain of the subject." '737 Patent, 9:27-42. *See also* '408 Patent 5:54-6:2.

"In some embodiments of at least one aspect described above, the devices further comprise logic

that controls the frequency to be any frequency between about 2 and about 20 HZ in increments of about 0.1 Hz. In some embodiments of at least one aspect described above, the devices further comprise logic that controls the frequency to be any frequency between about 2 and about 50 Hz in increments of about 0.1 Hz." '737 Patent, 11:53-59. *See* '408 Patent 8:5-11.

"Provided herein is a method comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject." '737 Patent, 18:1-11.

"In some methods, the magnetic field is generated by movement of at least one permanent magnet. In some methods, the strength of the at least one permanent magnetic is from about 10 Gauss to about 4 Tesla." '737 Patent, 18:29-32. *See also* '737 Patent, 9:52-54; '737 Patent 32:23-28; '737 Patent 43:15-22; '408 Patent 6:3-5; '408 Patent 6:13-15; '408 Patent 7:36-38; '408 Patent 30:66-31:2.

"In some embodiments, the system comprises logic that controls the frequency to be any frequency between about 0.5 Hz and about 100 Hz in increments of about 0.1 Hz." '737 Patent, 19:1-3; *see also* '737 Patent, 33:11-13; '737 Patent, 29:3-4 (similar for device); '408 Patent 8:5-11 (similar with different measurements and increments).

"In some embodiments, the method comprises the steps of: adjusting frequency of said magnetic field based on the EEG data of the subject; and repeating the applying step with an adjusted frequency. In some embodiments, applying of the magnetic field applies the magnetic field to a diffuse area in a brain of the subject. In some embodiments, the magnetic field is generated by movement of at least one permanent magnet. In some embodiments, said movement comprises at least one of rotational motion, linear motion, and swing motion. In some embodiments, a frequency of the magnetic field with the specified EEG band is from about 0.5 Hz to about 100 Hz. In some embodiments, the strength of the at least one permanent magnet is from about 10 Gauss to about 4 Tesla. In some embodiments, the distance between the at least one permanent magnet and the subject is from about 1/32 in to about 12 in. In some embodiments, the step of applying the magnetic field is for about 5 minutes to about two hours. In some embodiments, the method comprises repeating the applying step after an interval about 6 hours to about 14 days." '737 Patent, 26:46-64.

"In some embodiments, the magnetic field used by the methods or devices are not capable of exciting brain cells. In some embodiments, the magnetic field used by the methods or devices are below thresholds of exciting brain cells. In some embodiments, the devices described can have one or more permanent magnets mounted onto one or more rotating shafts in such a way that it creates an alternating magnetic field when the shaft or shafts are spun. In some embodiments, the speed of rotation can be set by the user or controlled using neurological feedback to provide optimal therapy." '737 Patent, 37:30-39.

"In some embodiments, the application area is subject to a "full waveform" according to the devices and methods described." '737 Patent, 44:7-9. *See also* '408 Patent 31:59-61.

"In some embodiments, the application area is Subject to a "half waveform" according to the devices and methods described." '737 Patent, 45:11-13. *See also* '408 Patent 32:64-66.

"By laterally displacing magnets so arranged proximate to an application area, Such area is Subjected to a repeating half waveform (full north to Zero to full north). In another embodiment,

by reversing the polarity of the magnets proximate to the application area, such area is subjected to a repeating half waveform (full south to Zero to full south)." '737 Patent, 45:48-54. *See also* '408 Patent 33:36-42.

"In some oscillatory embodiments, a plurality of elongated magnetic sources are placed adjacent to each other so that a repeating pattern of alternating magnetic poles are formed, the poles being spaced apart by a predetermined distance. The oscillation of the magnetic sources by a distance equal to or greater than the predetermined distance Subjects an application area to a complete reversal of magnetic flux, i.e., a full waveform." '737 Patent, 45:55-62. *See also* '408 Patent 33:43-50.

"The phrase "continuously applied' or "continuous application" refer to treatments where an application area is Subject to at least one magnetic field with a full waveform or a half waveform for a period of time typically longer than 2 minutes. Such phrases are distinguished from short pulse application (typically microseconds) of a magnetic field." '737 Patent, 47:15-21. *See also* '408 Patent 35:4-9.

"The device may comprise at least two permanent magnets 2802a, 2802b, wherein the subunit (not shown in FIG. 28, but shown in other figures, for example, FIGS. 1-4, 24, 25, 27) of the device is coupled to both the first and the second magnet, and wherein the subunit enables movement of the second magnet at a frequency between about 0.5 Hz and about 100 Hz. The subunit may enable movement of the second magnet at a frequency between about 2 Hz, and about 20 Hz. The subunit may enable movement of the first and second magnet at the same frequencies." '737 Patent, 47:60-48:2. *See also* '408 Patent 35:49-58.

"Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing a Q-factor of an intrinsic frequency of an EEG band of a subject toward a target Q-factor; and applying said output current across a head of the subject." '737 Patent, 53:65-54:2. *See also* '408 Patent 41:52-56. *See also* '408 Patent 47:14-18.

"In some embodiments, the frequency of the output current has a waveform. In some embodiments, the waveform is a sinusoidal or near-sinusoidal AC microcurrent waveform (i.e. a controlled waveform). In some embodiments, the waveform is any waveform described herein, including but not limited to a half waveform and/or a full waveform." '737 Patent, 60:45-50. *See also* '408 Patent 48:24-29.

"The direction of rotation relative to the subject can vary depending on the specific therapy desired. Also, the speed of rotation can be adjusted to provide the optimal therapeutic benefit. The speed adjustment itself can come from the user of the device or from a controller that uses feedback from a bio-sensor to determine the optimal speed." '737 Patent, 61:15-20. *See also* '408 Patent 48:60-65.

"In particular embodiments, a bar magnet can be mounted at the end of the shaft with the line through the poles perpendicular to the axis of the shaft. The shaft can be rotated by an adjustable motor. The magnet can rotate so that the plane of rotation is perpendicular to the Surface of the scalp. Accordingly, the positive and negative poles of the magnet can be alternately brought in close proximity to the scalp. This can create a near-sinusoidal magnetic field in the brain in which the location where the field is strongest is that which is closest to the magnet." '737 Patent, 61:21-30. *See also* '408 Patent 48:66-49:8.

"The magnet can be positioned above the subject's scalp such that the plane of rotation is parallel to the Surface of the scalp. Accordingly, the positive and negative poles can rotate in a circle around the scalp. This can create a sinusoidal magnetic field in the brain in which the phase of the magnetic field is dependent on where the magnetic poles are in their rotation. In general, the

magnetic field under one pole will be of opposite polarity to the magnetic field under the opposite pole." '737 Patent, 61:37-46. *See also* '408 Patent 49:15-23.

"Once contact is made, the patient lies still with eyes closed while the pMERT (NEST) acquires a representative EEG sample. The EEG data is analyzed and, depending on the therapy to be delivered, the magnet or magnets are rotated at the appropriate speed." '737 Patent, 62:45-49. *See also* '408 Patent 50:23-27.

"The psychiatrist will connect the pMERT (NEST) device to the PC via a USB cable and will login to the NeoSync website as before. The website will detect the pMERT (NEST) and will upload all treatment information. A report can be generated with this information, giving the psychiatrist a quantitative indication of progress. The report can include for each treatment the date, start time, end time, initial EEG alpha parameters (i.e., power and Q-factor), and the final EEG alpha parameters." '737 Patent, 63:29-38. *See* '408 Patent 51:7-16.

"EEG data during treatments are recorded and individualized according to the alpha EEG intrinsic frequency (8-13 Hz). The precision of the stimulus rate can be refined to the level of 10% of a hertz. It is determined on each patient's average alpha frequency, obtained from 3 central EEG leads (C**3**, C**4**, and Cz)." '737 Patent, 63:65-64:3. *See* '408 Patent 51:44-49.

"Raw EEG data are edited offline by an experienced technician who is blind to the treatment conditions to eliminate any significant (>3 arc) eye movements or any other type of apparent artifact. Ten to twenty-four artifact-free epochs (1,024 data points per epoch) in each recording channel are calculated by a fast Fourier transform (FFT) routine to produce a power spectrum with 0.2 Hz frequency resolution. The intrinsic frequency of alpha EEG is defined as the mean peak frequency (Fp) of 3 central leads (C**3**, C**4**, and Cz). EEG variables used in the analysis included power density (Pwr), peak frequency (Fp), Fp longitudinal coherence, and frequency selectivity (Q). See Jin Y et al. Alpha EEG predicts visual reaction time. *Int J Neurosci.* 116: 1035-44 (2006), which is incorporated by reference in its entirety." '737 Patent, 64:45-58. *See also* '408 Patent 52:23-36.

"Coherence analysis is carried out between Fz and Pz in the peak alpha frequency. Recording from Cz is chosen to calculate the Q-factor (peak freq/half-power bandwidth), a measure of the alpha frequency selectivity. It is measured in the frequency domain by using a 60 sec artifact free EEG epoch and a 2,048 data point FFT with a 10-point smooth procedure. Multivariate analysis of variance (MANOVA) across all channels for each variable is performed to test the treatment and stimulus location effects. Change score for each variable before and after pMERT (NEST) treatment is used to correlate with the change score of each clinical measure from the same time points.

FIG. 12 shows an example of the Q-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The Q-factor is defined as the ratio of $f_0/\Delta f$. As can be seen, when ΔF decreases for a given f_0, the Q-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases." '737 Patent, 64:59-65:3. *See also* '408 Patent 52:37-59.

"An effect of use of a NEST (i.e. pMERT) device using a method provided herein was shown to lower blood pressure in a female patient. The patient, originally using a NEST to treat anxiety, complained of a moderate tension headache and her blood pressure was taken, and read at 110/90 mmHg. A NEST device was set at a fixed specified frequency equal to an intrinsic frequency within her alpha EEG band and the magnetic field emanating from the device was applied to the

patient's head (cerebral cortex)." '737 Patent, 65:19-27. *See also* '408 Patent 52:65-53:6.

"In particular embodiments, a single cylindrical magnet that is diametrically magnetized (pole on the left and right sides of the cylinder) spins about the cylinder axis. The magnet can be placed anywhere around the patient's head, and locations can be chosen based on the desire for a more focal therapy at a particular location. Alternative embodiments can include stringing two or more cylindrical magnets together on the same shaft, or along different shafts, to spin the magnets in unison to create a particular magnetic field in treating the patient. A non-limiting examples of this are found in FIGS. 13 through 15.

FIG. 13 shows an example embodiment of a diametrically magnetized cylindrical magnet **2** for use in a NEST device. FIG. 14 shows an example embodiment of a NEST device applied to a subject **1406**, the device having a diametrically magnetized cylindrical magnet **1402** and a drive shaft **1404** that rotates the magnet **1402** about its cylinder axis, wherein the cylinder axis coincides with rotation axis **1438**. FIG. 15 shows an example embodiment of a NEST device applied to a subject **1506**, the device having two diametrically magnetized cylindrical magnets **1502** *a*, **1502** *b* and a drive shaft **1404** that simultaneously rotates the magnets **1502** *a*, **1502** *b* about their cylinder axes, wherein the cylinder axes are coincident with each other and with rotation axis. In this example embodiment device, the north pole of magnet **1502** *a* and the north pole of magnet **1502** *b* are aligned to provide a more uniform magnetic field to the subject **1506**." '737 Patent, 65:36-62. *See also* '408 Patent 53:27-42.

"FIG. 16 shows an example embodiment of a NEST device having three diametrically magnetized cylindrical magnets **1602** *a*, **1602** *b*, **1602** *c* rotating about their cylinder axes and applied to a subject **1606**. The poles of each the magnets **1602** *a*, **1602** *b*, **1602** *c* of the shown device are aligned generally to provide a peak magnetic field to the subject **1606** that is coincident with the peak magnetic fields delivered to the subject **1606** from each of the other magnets **1602** *a*, **1602** *b*, **1602** *c*. Another way of saying this is that each of the magnets **1602** *a*, **1602** *b*, **1602** *c* has a neutral plane indicated by the dotted line on each of magnets **1602** *a*, **1602** *b*, and **1602** *c*, and each the neutral planes is aligned to be generally parallel to the scalp of the subject **1606**. This configuration provides a more uniform field to the subject **1606** than if the magnets **1602** *a*, **1602** *b*, **1602** *c* are not aligned in such a manner." '737 Patent, 66:4-18. *See also* '408 Patent 53:51-65.

"Furthermore, since the fourth drive belt **1718** *d* is wrapped at least partially around the fourth tensioner pulley **1714** *c* of the second tensioner assembly **1708** *b*, and is also wrapped at least partially around the fourth magnet pulley **1716** *d* of the third magnet **1702** *c*, the motion of the fourth drive belt **1718** *d* drives the rotation of the third magnet **1702** *c* simultaneously with the rotation of the other two magnets **1702** *a*, **1702** *b*." '737 Patent, 67:39-45. *See also* '408 Patent 55:18-24.

"In an alternative embodiment, the magnets are coupled to each other by a rotation means, wherein the rotation means is configured to drive the rotation of the magnets simultaneously." '737 Patent, 67:59-62. *See also* '408 Patent 55:38-41.

"The tensioner assemblies in the embodiments shown in FIG. 17, FIG. 18, and FIG. 19, for non-limiting example, are configured to keep the drive belts taut during use and, therefore, ensure that the rotation of the magnets is simultaneous and generally in-phase as applied to the subject where the magnets are aligned such that each of the neutral planes of each of the three magnets are generally aligned to be parallel to the scalp of the subject." '737 Patent, 67:63-68:3. *See also* '408 Patent 55:42-49.

"The magnets **1902** *a*, **1902** *b*, **1902** *c* are rotatably coupled to side supports **1922**, **1920**, and at least one magnet **1902** *a* in the embodiment shown is coupled to a drive shaft **1904** which rotates

the magnet **1902** *a* to which it is directly coupled, and through the cooperation of the magnet drive pulleys **1916** *a*, **1916** *b*, **1916** *c*, **1916** *d*, drive belts **1918** *a*, **1918** *b*, **1918** *c*, **1918** *d*, and tensioner drive pulleys **914** *a*, **1914** *b* (not shown) **1914** *c* (not shown) **1914** *d* (not shown), also rotates the other magnets **1902** *b*, **1902** *c* of the NEST device such that all of the magnets **1902** *a*, **1902** *b*, **1902** *c* rotate simultaneously." '737 Patent, 69:14-23. *See also* '408 Patent 56:60-57:2.

"The drive shaft **2004** thus rotates all of the magnets **2002** *a*-**2002** *h* simultaneously through a series of drive belts **2018** *a*-**2018** *h* and magnet drive pulleys **2016** *a*-**2016** *n* all coupled to the drive shaft **2004**." '737 Patent, 69:34-37. *See also* '408 Patent 57:13-16.

"As arranged, therefore, the motion of the first drive belt **2018** *e* coupled to the drive shaft **2004** rotates the first magnet **2002** *e*, the second magnet **2002** *f*, the third magnet **2002** *g*, and the fourth magnet **2002** *h* simultaneously." '737 Patent, 69:54-57. *See also* '408 Patent 57:33-36.

"As arranged, therefore, the motion of the fifth drive belt **2018** *d* coupled to the drive shaft **2004** rotates the fifth magnet **2002** *d*, the sixth magnet **2002** *c*, the seventh magnet **2002** *b*, and the eighth magnet **2002** *a* simultaneously." '737 Patent, 70:7-11. *See also* '408 Patent 57:53-57.

"The drive shaft **2104** thus rotates all of the magnets **2102** *a*-**2102** *h* simultaneously through a series of drive belts **2118** *a*-**2118** *h* all coupled to the drive shaft **2104**." '737 Patent, 70:32-35. *See also* '408 Patent 58:11-14.

"Where the cover **2350** is disc-shaped, as shown in FIG. 23, the hole **2356** is located the center of the disc cover **2350**, and the hole **2356** is configured such that the drive shaft **2304** may rotate freely within the hole **2304**, for example, with aid of a bearing which allows drive shaft rotation (and, thus, magnet rotation) relative to the covers **2350**, **2352**." '737 Patent, 71:46-52. *See also* '408 Patent 59:25-31.

"The motor driver **2574**, which can control, for non-limiting example, the speed, direction, acceleration, etc, of the magnet **2502** through the drive shaft **2504**, can be directed and/or monitored by controls such as, for example, a device speed control **2560**, an on/off control **2562**, a display **2564**, a random/continuous control **2566**, and a high/low control **2568**. A user can adjust each of these controls, which are coupled to a processor circuit board **2570** and thus coupled to the motor driver **2574**." '737 Patent, 72:15-23. *See also* '408 Patent 59:61-60:2.

"Alternatively, and/or additionally, the drive shaft **2504** and/or the magnet(s) may be controlled automatically based on a prescribed treatment (time of treatment, frequency of magnet rotation, etc) that is downloaded and/or programmed into the processor circuit board **2570** from a source external or internal to the controller subunit, as previously described herein. Treatments received may be stored by the controller subunit. Additionally and/or alternatively, where EEG electrodes are also present in the device and are capable of measuring the subject's brain waves, the device may adjust the treatment automatically by a biofeedback system. Additionally and/or alternatively, where EEG electrodes are present in the device and are capable of measuring the subject's brain waves, the treatment may be chosen based on the readings of the subject's brain waves prior to the treatment. Additionally and/or alternatively, where EEG electrodes are present in the device and are capable of measuring the subject's brain waves, the treatment may be chosen automatically by the device based on the readings of the subject's brain waves prior to the treatment and based on a set of rules stored in the controller subunit. Additionally and/or alternatively, where EEG electrodes are present in the device and are capable of measuring the subject's brain waves, the controller subunit is capable of storing the output of the EEG electrodes prior to, during, and/or after treatment with the NEST device. Additionally and/or

alternatively, where EEG electrodes are present in the device and are capable of measuring the subject's brain waves, the controller subunit is capable of transmitting the output of the EEG electrodes prior to, during, and/or after treatment with the NEST device. This transmitting may be real-time (during measurement), or after storage of the EEG electrode outputs and during an upload or download from the NEST device." '737 Patent, 72:24-56. *See also* '408 Patent 60:3-36.

"The NEST device was used to tune an intrinsic frequency (of the patient's alpha wave). Following treatment, the patient reported a reduction of the symptoms of fibromyalgia." '737 Patent, 72:66-73:2. *See also* '408 Patent 60:46-49.

"FIG. 26 shows an example embodiment of a NEST device having a single bar magnet **2602** that moves linearly along its north-south axis **2639** once each time the supporting ring (or annulus) **2619** is rotated (rotation shown by arrows in FIG. 26), providing a pulse-type alternating magnetic field at the frequency of rotation. In this embodiment, a magnet **2602** is secured against a rotating ring (or annulus) **2619** with a spring **2628**, where the ring **2619** has one or more detents **2629**. The subject **2606** is shown below the ring **2619** in FIG. 26. When the ring **2619** is rotated, as shown with the arrows in FIG. 26, the magnet **2602** will be thrust into each detent **2629** once per rotation. As the ring **2619** continues to rotate, the magnet **2602** will move back to its original position. This periodic thrust may generate a more unipolar pulsatile magnetic field than that generated by a rotating magnet. The width and amplitude of the magnetic pulse depends on the mass and strength of the magnet, as well as the strength of the spring, and the depth of the detent." '737 Patent, 73:6-22. *See also* '408 Patent 60:53-61:3.

"The study was conducted at two sites. In the method used in this trial, a magnetic field was adjusted to influence the Q-factor of an intrinsic frequency of each subject within the alpha-band. The magnetic field was applied close to the head of the subject. EEG readings were taken before treatment began. The magnets were in the same location and rotated in the same manner for all subjects receiving the magnetic therapy. All subjects underwent a traditional 19-lead EEG recording. A Cadwell Easy 2.1 EEG system was used to take the 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. The specific alpha frequency (pre-selected frequency) was selected from the EEG recording using a curve-fitting technique to determine the subject's intrinsic frequency of the alpha wave and to determine the Q-factor of the alpha wave." '737 Patent, 74:7-21.

"Patients were placed in one of three groups: constant frequency, random frequency, or sham, with equal probability for each group. The sham treatment (SHAM) was created using the prototype by substituting steel cylinders of the same weight and size for the 3 magnets. The sham operates identically to the device, except that no alternating magnetic field is generated. The sham is indistinguishable from the device in that it looks and sounds the same, and has the same vibration when in operation. When using the sham, the same procedure as the prototype was followed in that the subject's EEG was recorded and the sham cylinder rotation was set to the average alpha frequency (the subject's intrinsic frequency of his/her alpha wave)." '737 Patent, 74:22-34.

"Study subjects were randomized to one of three treatment arms, consisting of either a fixed frequency magnet rotation, a random frequency magnet rotation, or sham treatment. Sham treatments (SHAM) simulating both fixed and random frequency were employed to ensure blinding of the study subjects and personnel at the clinical sites. Both a fixed and a random frequency were evaluated, with the goal of assessing any differences between these two treatment patterns. If the patient was in the "constant frequency" group, the NEST was set to rotate the magnets at the intrinsic frequency. If the patient was in the "random frequency" group, the NEST was set to rotate the magnets at random frequencies between 6 Hz and 12 Hz, changing frequencies once per second. If the patient was in the "SHAM" group, the magnets in

the NEST were replaced with steel cylinders, thereby imparting no magnetic field to a head of the patient. The patients in this group were divided into two subgroups with equal probability, with one group having the cylinders rotated at the intrinsic frequency and the other group having the cylinders rotated at random frequencies as noted above." '737 Patent, 74:45-64.

"Study subjects were treated daily on weekdays (Monday through Friday) for four weeks, with treatment consisting of a single 30-minute session. All treatment sessions were administered at the study site. Baseline EEG and clinical symptoms were recorded 3 days or less prior to the first session of treatment followed by series of quantitative analyses.
The subject's EEG was recorded weekly during the study with a 19-channel system with the subject at rest with eyes closed. An FFT with a 30-second window was used to quantify the signal of each channel to produce consecutive frequency bands alpha, beta, delta, and theta. The alpha band was further analyzed with the non-linear curve fitting to obtain the Q-factor for the subject. Single Photon Emission Computed Tomography (SPECT) scans were taken at baseline and at the end of the 4-week study for the subjects enrolled at the U.S. clinical site. Voxel readings of given areas were averaged across different slices to render a mean value of each Region of Interest (ROI)." '737 Patent, 75:5-24.

"No study site interaction was found (F1,43=0.22, P=0.64). Therefore, the results provided combine data from both sites. FIG. 38 shows the HAMD-17 score mean and standard error at baseline and at the end of each week of treatment. The first set of four bars represent the HAMD-17 weekly change in the SHAM group, the second set of four bars represent the HAMD-17 weekly change in the test group (NEST) of subjects having a fixed pre-selected frequency emitted from the device (the fixed pre-selected frequency being, in this example, the subject's own average intrinsic frequency), and the third set of four bars represent the HAMD-17 weekly change in the test group (NEST) of subjects having a random frequencies (hopping frequencies) emitted from the device within the alpha band (8-13 Hz), independent of the subject's own average intrinsic frequency. Each of the bars within each test group represents the average HAMD score at the end of a week, starting with week 0 (baseline), week 1, 2, 3, and 4, left to right, respectively. After the fourth week of treatment, the NEST groups were significantly better than the SHAM as an overall measure (F1, 43=10.17, P=0.003), or on a time by treatment interaction (F3, 129=6.7, P=0)." '737 Patent, 75:62-76:15.

"Each subject's EEG was recorded at baseline and at the conclusion of 4 weeks of treatment. The NEST device reduced the alpha EEG Q-factor significantly (F1,18>4.3, P<0.05) as measured by the global average or the average at the pre-frontal cortex (P=0.03). The decrease in Q-factor correlates well with clinical improvement in depression symptoms (r=0.46, P=0.01). FIG. 40 shows the change in HAMD-17 score versus the change in the alpha Q-factor. That is, it shows the percent improvement in HAMD score compared to the percent change in Q-factor for subjects who received the NEST device treatment. The change in the Q-factor of the alpha wave (as a %) is presented along the x-axis, while the change in HAMD Score (as a %) is presented along the y-axis. A decrease in HAMD-17 score was generally accompanied by a decrease in Q-factor of the alpha frequency. The bestfit line was plotted of the data (Linear regression R Squared value of 0.212)." '737 Patent, 77:11-27.

"adjusting output of a magnetic field and moving the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band, wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***" '737 Prosecution History at *1308 (February 13, 2014 Amendment in Response to Non-Final Office Action, p. 6).

V. Close to the Head (Claim Number 26)

In one aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject. ’408 Patent 1:40-45. *See also* ’408 Patent 17:25-38 (similar).

In another aspect are methods of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, amblyopia or Parkinson's disease). ’408 Patent 1:46-67. *See also* ’408 Patent 17:39-55 (similar); ’408 Patent 19:27-45 (similar for treatment of PTSD); ’408 Patent 21:15-32 (similar for treatment of coma); ’408 Patent 24:12-29 (similar for treatment of Parkinson’s Disease); ’408 Patent 40:64-41:15; ’490 Patent 6:7-25 (similar); ’490 Patent 31:4-22; ’737 Patent 6:4-22; ’737 Patent 24:4-21.

In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject. ’408 Patent 2:1-6. *See also* ’408 Patent 17:62-67 (similar); ’490 Patent 6:26-31 (similar); ’490 Patent 31:23-28 (similar); ’737 Patent 29:53-58.

In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: determining the Q-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the Q-factor of the intrinsic frequency from step (a) to an average Q-factor of the intrinsic frequency of a control group; if the Q-factor of the intrinsic frequency from step (a) is higher than the average Q-factor of the intrinsic frequency of the control group, tuning down the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a plurality of frequencies or with a single target frequency close to a head of the subject; and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the intrinsic frequency of the control group, tuning up the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a target frequency to a head of the subject. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not

having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, amblyopia, or Parkinson's disease). ’408 Patent 2:7-27. *See also* ’408 Patent 18:1-17 (similar); ’408 Patent 41:16-34; ’490 Patent 6:33-42 (similar); ’737 Patent 6:29-44.

In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value; and (b) applying said magnetic field close to a head of the subject In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a control group; if the coherence value from step (a) is higher than the average coherence value of the control group, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the control group, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, amblyopia, or Parkinson's disease). ’408 Patent 2:28-54. *See also* ’408 Patent 18:18-39 (similar); ’408 Patent 20:1-23 (similar for treatment of PTSD); ’408 Patent 21:61-22:22 (similar for treatment of coma); ’408 Patent 23:1-14 (similar for treatment of amblyopia); ’408 Patent 24:62-25:11 (similar for treatment of Parkinson’s Disease); ’408 Patent 26:49-27:12 (similar for improving cognitive performance).

In another aspect are methods of using a Transcranial Magnetic Stimulation (TMS) device for influencing an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject; ’408 Patent 2:55-61. *See also* ’408 Patent 18:40-46 (similar); ’408 Patent 20:31-38 (similar for treatment of PTSD); ’408 Patent 22:23-29 (similar for treatment of coma); ’408 Patent 23:15-21 (similar for treatment of amblyopia)’ ’408 Patent 25;12-19 (similar for treatment of Parkinson’s Disease); 27:13-20 (similar for improving cognitive performance); ’408 Patent 42:34-40; ’490 Patent 7:4-10 (similar); ’490 Patent 8:4-10 (similar); ’490 Patent 32:1-7; ’737 Patent 7:1-7; ’737 Patent 30:31-37.

In some embodiments, a method is provided for treating post traumatic stress disorder in a subject, comprising tuning the Q-factor of an intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein the magnetic field comprises at least one of (a) a single frequency; (b) a plurality of frequencies within a specified EEG band; and (c) an intrinsic frequency of a brain of the subject within a specified EEG band. In some embodiments, any of the devices described herein may be used to treat post traumatic stress disorder. ’408 Patent 2:62-3:4. *See also* ’408 Patent 3:5-14 (similar disclosure for treatment of coma); ’408 Patent 3:15-23 (similar disclosure for treatment of amblyopia); ’408 Patent 3:33-40 (similar

disclosure for treatment to improve performance); ’490 Patent 7:11-20 (similar disclosure for treatment of anxiety); ’737 Patent 7:8-16.

In some embodiments, a method is provided for treating Parkinson's Disease in a subject, comprising adjusting an intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein the magnetic field comprises at least one of (a) a single frequency; (b) a plurality of frequencies within a specified EEG band; and (c) an intrinsic frequency of a brain of the subject within a specified EEG band. In some embodiments, any of the devices described herein may be used to treat Parkinson's Disease.’408 Patent 3:24-32.

In another aspect are methods for modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject of a specified EEG frequency toward a target EEG phase of the specified EEG frequency; and (b) applying said magnetic field close to a head of the subject. ’408 Patent 3:48-54. *See also* ’408 Patent 18:47-53; ’408 Patent 20:31-38 (similar for treatment of PTSD); ’408 Patent 22:30-37 (similar for treatment of coma); ’408 Patent 25:20-27 (similar for treatment of Parkinson’s Disease); ’408 Patent 27:21-27 (similar for improving cognitive performance).

In another aspect are methods for influencing an EEG phase of a specified EEG frequency between multiple locations of a brain of a subject, comprising: (a) determining the EEG phase the between at least two locations measured on the head of the subject; (b) comparing the EEG phase from step (a) to an average EEG phase of a control group; and (c) applying a magnetic field close to a head of the subject wherein applying the magnetic field influences the determined EEG phase toward the average EEG phase of a control group. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, amblyopia, or Parkinson's disease). ’408 Patent 4:11-26. *See also* ’408 Patent 18:54-63; ’408 Patent 20:39-48 (similar for treatment of PTSD); ’408 Patent 22:38-47 (similar for treatment of coma); ’408 Patent 23:22-29 (similar for treatment of amblyopia); ’408 Patent 25:28-36 (similar for treatment of Parkinson’s Disease); ’408 Patent 27:29-39 (similar for enhancing cognitive performance).

In another aspect are methods for using a Transcranial Magnetic Stimulation (TMS) device for influencing an EEG phase of a subject of a specified EEG frequency, comprising: (a) adjusting output of said TMS device; (b) changing the EEG phase by repetitive firing of at least one magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject. ’408 Patent 4:27-33. *See also* ’408 Patent 18:64-19:3 (similar); ’408 Patent 20:50-55 (similar for treatment of PTSD); ’408 Patent 22:48-54 (similar for treatment of coma); ’408 Patent 23:40-46 (similar for treatment of amblyopia); ’408 Patent 25:38-44 (similar for Parkinson’s Disease); ’408 Patent 27:40-46 (similar for enhancing cognitive performance); ’490 Patent 41:52-58; ’737 Patent 7:66-8:5; ’737 Patent 36:43-48; ’737 Patent 54:48-54.

In another aspect are devices comprising a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing an intrinsic

frequency of a brain of the subject within a specified EEG band. ’408 Patent 7:12-16. *See also* ’490 Patent 10:66-11:3; ’737 Patent 10:60-64.

In another aspect are devices comprising a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing a Q-factor of an intrinsic frequency of a brain of the subject within a specified EEG band. ’408 Patent 7:17-21. *See also* ’490 Patent 11:4-8; ’737 Patent 10:65-11:2.

In another aspect are devices comprising a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band. ’408 Patent 7:22-26. *See also* ’490 Patent 11:9-12; ’737 Patent 11:3-7.

Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing an intrinsic frequency of an EEG band of a subject toward a target frequency of the EEG band; and applying said output current across a head of the subject. ’408 Patent 10:63-67. *See also* ’408 Patent 41:57-61; ’490 Patent 14:49-53; ’737 Patent 14:45-49.

Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing a Q-factor of an intrinsic frequency of an EEG band of a subject toward a target Q-factor; and applying said output current across a head of the subject. ’408 Patent 11:28-32. *See also* ’408 Patent 41:52-56; ’490 Patent 15:9-13; ’737 Patent 15:5-9.

Provided herein is a device comprising,

(a) a means for applying a first magnetic field to a head of a subject; and

(b) a means for applying a second magnetic field to a head of a subject;

whereby the means for applying the first magnetic field and the means for applying the second magnetic field are capable of influencing an EEG phase between at least two sites in a brain of the subject of a specified EEG frequency. ’408 Patent 14:1-10. *See also* ’490 Patent 17:40-48; ’737 Patent 17:35-43.

Disclosed herein, in certain embodiments, are methods of treating PTSD by modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor (i.e., a measure of frequency selectivity of a specified EEG band) of the subject toward a target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject. In some embodiments, the Q-factor is adjusted (or tuned) up. In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: determining the Q-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the Q-factor of the intrinsic frequency from step (a) to an average Q-factor of the intrinsic frequency of a control group; if the Q-factor of the intrinsic frequency from step (a) is higher than the average Q-factor of the intrinsic frequency of the control group, tuning down the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a plurality of frequencies or with a single target frequency close to a head of the subject;

and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the intrinsic frequency of the control group, tuning up the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a target frequency to a head of the subject. '408 Patent 19:44-67. *See also* '408 Patent 21:35-60; '408 Patent 24:33-61 (similar for treatment of Parkinson's Disease); '408 Patent 26:24-48.

Disclosed herein, in certain embodiments, are methods of treating a coma by modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject of a specified EEG frequency toward a target EEG phase of the specified EEG frequency; and (b) applying said magnetic field close to a head of the subject. '408 Patent 22:30-37. *See also* '408 Patent 23:22-29 (similar for amblyopia).

In some embodiments, a method of modulating the electrical activity of a brain in a subject in need thereof comprises: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a target Q-factor of the band; and (c) applying said magnetic field close to a head of the subject. '408 Patent 30:23-29.

Provided herein is a device comprising, a means for applying a first magnetic field to a head of a subject; and a means for applying a second magnetic field to a head of a subject whereby the means for applying the first magnetic field and the means for applying the second magnetic field are capable of influencing an EEG phase between at least two sites in a brain of the subject of a specified EEG frequency. The magnetic fields (first magnetic field, and second magnetic field) may be of the same frequency, but out of phase with each other. '408 Patent 37:53-62.

Provided herein is a method of modulating the electrical activity of a brain in a subject in need thereof, comprising adjusting output of a magnetic field for influencing a Q-factor a measure of frequency selectivity of a specified EEG band of the subject toward a target Q-factor of the band; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. '408 Patent 40:41-54.

Provided herein is a method of modulating the electrical activity of a brain in a subject in need thereof, comprising adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. '408 Patent 40:55-63.

Provided herein is a method of improving coherence of intrinsic frequencies within a specified EEG band among multiple locations of a brain of a subject, comprising determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a control group; if the coherence value from step (a) is higher than the average coherence value of the control group, lowering the coherence value of the subject by applying at least two asynchronous

magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the control group, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. '408 Patent 41:35-51.

The effect of the use of a NEST device according to the methods and device descriptions provided herein is tested. Subjects are recruited who have Parkinson's disease with measurable symptoms, and who are willing to consent to the treatment.
The study will be a one-time test to look for improvement. The test is composed of the following:

a. The subject undergoes an examination and quantitative test to determine the extent of the symptoms. This includes a brief video interview in which the subject responds to questions about symptoms.

b. A 2-lead EEG recording is made. This EEG is examined to determine the proper settings for the device.

c. The subject lays with his/her head in the device for 30 minutes while a gentle, low energy, low frequency magnetic field is generated above the scalp.

d. When treatment is complete, an additional EEG recording is made. This is used to compare with the original recording to determine any changes.

e. The subject undergoes a second examination and quantitative test to see if symptoms have improved. This includes a second brief video interview.

'408 Patent 63:5-27. *See also* '408 Patent 63:46-60 (similar for treatment of coma); '408 Patent 63:66-64:18 (similar for treatment of PTSD); '408 Patent 64:24-42.

Katz discloses a method that influences EEG frequencies in the brain by applying a magnetic field close to the head of a subject. '408 Prosecution History at *657.

Katz discloses a method that influences EEG frequencies in the brain by applying a magnetic field close to the head of a subject by stimulation along multiple sites in a brain of a subject. '408 Prosecution History at *658.

In one aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected or target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject. '490 Patent 1:41-46. *See also* '490 Patent 6:48-54; '490 Patent 24:53-58; '737 Patent 1:38-44; '737 Patent 23:1-6.

Provided herein are methods of treating a subject, comprising determining the intrinsic frequency (f) of the subject within the specified EEG band by: obtaining EEG data of the subject's brain;

removing any DC component in the signal; performing a Fast Fourier Transformation, X(f), on the EEG data; and achieving a fitted Gaussian curve, A(f), of the EEG data by: using the equation $A(f)=Ge^{(-(f-s)^2/2d^2)}$ (also depicted in FIG. 31), wherein G is gain, d is standard deviation, and s is the mean frequency based on the specified EEG band, and determining a goodness of fit measure by optimizing using the following equation

$$H(X,A) = \sum_{f=s-1\ \mathrm{Hz}}^{s+1\ \mathrm{Hz}} \left| X(f) - A(f) \right|$$

(also depicted in FIG. 32), by: estimating a first mean frequency, a first standard of deviation, and first gain for the first optimizing loop, shifting the gain, G, up or down slightly from the first gain, determining a new gain resulting in a better fit than that of the first gain, shifting the standard of deviation, d, up or down slightly from the first standard of deviation, determining a new standard of deviation resulting in a better fit than that of the first standard of deviation, shifting the mean frequency, s, up or down slightly from the first mean frequency, determining a new mean frequency resulting in a better fit than that of the first mean frequency, and repeating steps 2), 3), and 4), in which the first gain, the first standard of deviation, and the first mean frequency are replaced with a second gain, a second standard of deviation, and a second mean frequency, respectively, until the three parameters are optimized, comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a healthy population database; if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the healthy population database, shifting down the intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein said magnetic field has a frequency lower than the intrinsic frequency of the subject; and if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the healthy population database, shifting up the intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein said magnetic field has a frequency higher than the intrinsic frequency of the subject. ’490 Patent 1:27-2:25. *See also* ’490 Patent 24:59-25:46; ’737 Patent 1:45-2:23; ’737 Patent 23:7-24:3.

Provided herein is a method of using a Transcranial Magnetic Stimulation (TMS) device for influencing an intrinsic frequency of a subject within a specified EEG band, comprising: adjusting output of said TMS device; changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and applying said magnetic field close to a head of the subject, wherein the intrinsic frequency of the subject within the specified EEG band is determined by: obtaining EEG data of the subject's brain; removing any DC component in the signal; performing a Fast Fourier Transformation, X(f), on the EEG data; and achieving a fitted Gaussian curve, A(f), of the EEG data by: using the equation $A(f)=Ge^{(-(f-s)^2/2d^2)}$ (also depicted in FIG. 31), wherein G is gain, d is standard deviation, and s is the mean frequency based on the specified EEG band, and determining a goodness of fit measure by optimizing using the following equation

$$H(X,A) = \sum_{f=s-1\ \mathrm{Hz}}^{s+1\ \mathrm{Hz}} \left| X(f) - A(f) \right|$$

(also depicted in FIG. 32), by: estimating a first mean frequency, a first standard of deviation, and first gain for the first optimizing loop, shifting the gain, G, up or down slightly from the first gain, determining a new gain resulting in a better fit than that of the first gain, shifting the standard of deviation, d, up or down slightly from the first standard of deviation, determining a new standard of deviation resulting in a better fit than that of the first standard of deviation, shifting the mean frequency, s, up or down slightly from the first mean frequency, determining a new mean frequency resulting in a better fit than that of the first mean frequency, and repeating steps 2), 3), and 4), in which the first gain, the first standard of deviation, and the first mean frequency are replaced with a second gain, a second standard of deviation, and a second mean frequency, respectively, until the three parameters are optimized. '490 Patent 2:26-64. *See also* '490 Patent 26:17-57; '737 Patent 2:24-62; '737 Patent 24:65-25:37.

In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. '490 Patent 6:54-7:3. *See also* '490 Patent 31:51-67; '737 Patent 6:51-67; '737 Patent 30:14-30.

In some embodiments, are method of treating depression in a subject, comprising tuning down the Q-factor of an intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein the magnetic field comprises at least one of (a) a single frequency; (b) a plurality of frequencies within a specified EEG band; and (c) an intrinsic frequency of a brain of the subject within a specified EEG band. In some embodiments, any of the devices described herein may be used to treat depression. '490 Patent 7:21-30. *See also* '490 Patent 43:14-22 (similar for anxiety)' '490 Patent 43:23-31 (similar for depression); '737 Patent 7:17-25; '737 Patent 30:53-61; '737 Patent 38:13-21.

In another aspect are methods for treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject of a specified EEG frequency toward a pre-selected EEG phase of the specified EEG frequency; and (b) applying said magnetic field close to a head of the subject. '490 Patent 7:3-36. *See also* '490 Patent 32:8-13; '737 Patent 7:26-31; '737 Patent 30:38-43.

In another aspect are methods for influencing an EEG phase of a specified EEG frequency between multiple locations of a brain of a subject, comprising: (a) determining the EEG phase the between at least two locations measured on the head of the subject; (b) comparing the EEG phase from step (a) to an average EEG phase of a healthy population; and (c) applying a magnetic field close to a head of the subject wherein applying the magnetic field influences the

determined EEG phase toward the average EEG phase of a healthy population. ’490 Patent 7:61-8:3; ’737 Patent 7:56-65; ’737 Patent 36:34-41.

In some aspects, is a device for use in treating a subject, comprising: a Transcranial Magnetic Stimulation (TMS) device; whereby the means for applying the magnetic field is capable of influencing (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of a brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band; or (d) a combination thereof. Provided herein is a method of treating depression in a subject, comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex. ’490 Patent 17:64-18:12. *See also* ’490 Patent 19:12-24 (similar for treatment of depression); ’490 Patent 37:53-61 (similar); ’490 Patent 38:44-56 (similar); ’490 Patent 39:38-47 (similar); ’490 Patent 40:33-45 (similar); ’737 Patent 17:59-67.

Provided herein is a method of treating depression in a subject, comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency within a specified EEG band of the subject toward a pre-selected Q-factor; and applying said magnetic field close to a head of the subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex. ’490 Patent 18:30-37. *See also* ’490 Patent 18:21-29 (similar).

Provided herein is a method of treating depression in a subject, comprising tuning down the Q-factor of an intrinsic frequency of the subject by applying a magnetic field close to a head of the subject thereby increasing blood flow in the cortex, wherein the magnetic field comprises at least one of (a) a single pre-selected frequency; (b) a plurality of frequencies within a specified EEG band; and (c) an intrinsic frequency of a brain of the subject within a specified EEG band. In some embodiments, the blood flow increase is in the frontal cortex. ’490 Patent 18:38-47. *See also* ’490 Patent 19:55-65 (similar); ’490 Patent 38:3-12.

Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject. ’490 Patent 19:66-20:6. *See also* ’737 Patent 18:13-19 (similar).

Provided herein is a system for treating depression comprising: a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing at least one of: (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of the brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in the brain of the subject within a specified EEG band; and (d) a EEG phase between two sites in the brain of the subject of a specified EEG frequency, and a device capable of determining the blood flow of at

least one of the cortex and a lower region of the brain. '490 Patent 20:36-48. *See also* '737 Patent 18:48-59 (similar).

In another aspect are methods of treating a subject, comprising: determining the Q-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the Q-factor of the intrinsic frequency from step (a) to an average Q-factor of the intrinsic frequency of a healthy population database; if the Q-factor of the intrinsic frequency from step (a) is higher than the average Q-factor of the intrinsic frequency of the healthy population database, tuning down the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a plurality of frequencies or with a single pre-selected frequency close to a head of the subject; and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the intrinsic frequency of the healthy population database, tuning up the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a pre-selected frequency to a head of the subject. '490 Patent 31:29-44. *See also* '737 Patent 29:59-30:7.

In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value; and (b) applying said magnetic field close to a head of the subject '490 Patent 31:45-50. *See also* '737 Patent 30:8-13.

In another aspect are methods of treating anxiety in a subject, comprising tuning up the Q-factor of an intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein the magnetic field comprises at least one of (a) a single pre-selected frequency; (b) a plurality of frequencies within a specified EEG band; and (c) an intrinsic frequency of a brain of the subject within a specified EEG band. In some embodiments, any of the devices described herein may be used to treat anxiety. '490 Patent 32:14-22.

Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the dorsal and frontal regions of the cortex of the subject. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex. '490 Patent 32:50-33:10. *See also* '737 Patent 31:22-48.

Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected Q-factor; and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that decreases blood flow in a parietal-occipital region of the brain of the subject. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulated gyrus, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia. '490 Patent 33:11-28. *See also* '737 Patent 31:49-65.

Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a rear region of the brain of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected Q-factor; and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that decreases blood flow in a parietal-occipital region of the brain of the subject. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia. '490 Patent 33:29-46. *See also* '737 Patent 31:66-32:15.

Provided herein is a system for treating depression comprising: a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing at least one of: (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of the brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in the brain of the subject within a specified EEG band; and (d) a EEG phase between two sites in the brain of the subject of a specified EEG frequency, and a device capable of determining the blood flow of at least one of the cortex, a dorsal and frontal region, and a parietal-occipital region of the brain. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex. '490 Patent 34:16-34. *See also* '737 Patent 32:52-33:2.

Provided herein is a method of treating depression in a subject, comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex. '490 Patent 37:37-44. *See also*

’490 Patent 37:45-52 (similar for Q-Factor); ’490 Patent 37:53-61 (similar for coherence value); ’490 Patent 37:62-38:2 (similar for EEG phase).

Provided herein is a device for use in treating depression in a subject, comprising: a means for applying a magnetic field to a head of a subject thereby increasing blood flow in the cortex; whereby the means for applying the magnetic field is capable of influencing at least one of: (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of a brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band; and (d) a EEG phase between two sites in the brain of a subject of a specified EEG frequency. In some embodiments, the blood flow increase is in the frontal cortex. ’490 Patent 19:12-24. *See also* ’490 Patent 38:44-56 (similar); ’490 Patent 40:32-45 (similar).

Provided herein is a method of treating depression in a subject, comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject and thereby increasing energy in the cortex and/or metabolism of the cortex. In some embodiments, the blood flow increase and/or the increased metabolism is in the frontal cortex. ’490 Patent 39:20-28. *See also* ’490 Patent 39:29-37 (similar for Q-Factor); ’490 Patent 39:38-47 (similar for coherence value); ’490 Patent 39:48-56 (similar for EEG phase).

Provided herein is a method of treating depression in a subject, comprising tuning down the Q-factor of an intrinsic frequency of the subject by applying a magnetic field close to a head of the subject thereby increasing energy in the cortex and/or metabolism of the cortex, wherein the magnetic field comprises at least one of (a) a single pre-selected frequency; (b) a plurality of frequencies within a specified EEG band; and (c) an intrinsic frequency of a brain of the subject within a specified EEG band. In some embodiments, the blood flow increase and/or the increased metabolism is in the frontal cortex. ’490 Patent 39:57-67.

Provided herein is a device for use in treating depression in a subject, comprising: a means for applying a magnetic field to a head of a subject thereby increasing energy in the cortex and/or metabolism of the cortex; whereby the means for applying the magnetic field is capable of influencing at least one of: (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of a brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band; and (d) a EEG phase between two sites in the brain of a subject of a specified EEG frequency. In some embodiments, the blood flow increase and/or the increased metabolism is in the frontal cortex. ’490 Patent 40:32-45.

In some embodiments, are method of treating depression in a subject, comprising tuning down the Q-factor of an intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein the magnetic field comprises at least one of (a) a single frequency; (b) a plurality of frequencies within a specified EEG band; and (c) an intrinsic frequency of a brain of the subject within a specified EEG band. In some embodiments, any of the devices described herein may be used to treat depression. ’490 Patent 41:9-17. *See also* ’737 Patent 30:53-61.

In another aspect are methods for influencing an EEG phase of a specified EEG frequency between multiple locations of a brain of a subject, comprising: (a) determining the EEG phase the between at least two locations measured on the head of the subject; (b) comparing the EEG phase from step (a) to an average EEG phase of a healthy population; and (c) applying a magnetic field close to a head of the subject wherein applying the magnetic field influences the determined EEG phase toward the average EEG phase of a healthy population. '490 Patent 41:42-51. *See also* '737 Patent 36:32-41.

In some embodiments, a method of treating a subject comprises: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a pre-selected or target Q-factor of the band; and (c) applying said magnetic field close to a head of the subject. '490 Patent 47:49-54. *See also* '737 Patent 42:39-44.

Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. In some embodiments, influencing an intrinsic frequency may include influencing harmonics of the pre-selected intrinsic frequency of the specified EEG band. In some embodiments, the pre-selected intrinsic frequency is a harmonic of the peak intrinsic frequency of a specified EEG band. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency that can be represented in the frequency domain by an impulse function. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency having no variation (standard of deviation around the target frequency is 0). In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 1% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 5% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 10% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 10% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 15% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 20% of the target frequency. '490 Patent 57:27-65. *See also* '737 Patent 52:18-55.

Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing a Q-factor a measure of frequency selectivity of a specified EEG band of the subject toward a pre-selected Q-factor of the band; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method.

Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected coherence value; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method.

Provided herein is a method of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising determining the intrinsic frequency of the subject within the specified EEG band; comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a healthy population database; if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the healthy population database, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the healthy population database, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method.

Provided herein is a method of altering a Q-factor of an intrinsic frequency within a specified EEG band of a subject, comprising determining the Q-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the Q-factor of the intrinsic frequency from step (a) to an average Q-factor of the intrinsic frequency of a healthy population database; if the Q-factor of the intrinsic frequency from step (a) is higher than the average Q-factor of the intrinsic frequency of the healthy population database, tuning down the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with varying frequencies close to a head of the subject; and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the intrinsic frequency of the healthy population database, tuning up the Q-factor of the intrinsic frequency of the subject by applying a specific magnetic field with a pre-selected frequency close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method.

Provided herein is a method of improving coherence of intrinsic frequencies within a specified EEG band among multiple locations of a brain of a subject, comprising determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, a NEST

device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. '490 Patent 57:66-59:6. *See also* '737 Patent 52:56-53:64.

Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing a Q-factor of an intrinsic frequency of an EEG band of a subject toward a target Q-factor; and applying said output current across a head of the subject.

Provided herein is a method comprising adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject of a specified EEG frequency toward a pre-selected EEG phase of the specified EEG frequency; and applying said magnetic field close to a head of the subject. '490 Patent 59:7-17. *See also* '737 Patent 53:65-54:8.

In some embodiments, there is no pre-selected EEG phase. Rather, the method comprises adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject within a specified EEG band; and applying said magnetic field close to a head of the subject. The EEG phase may be influenced to be lower, or higher.

In another aspect are methods for influencing an EEG phase of a specified EEG frequency between multiple locations of a brain of a subject, comprising determining the EEG phase the between at least two locations measured on the head of the subject; comparing the EEG phase to an average EEG phase of a healthy population; and applying a magnetic field close to a head of the subject. Applying the magnetic field may influences the determined EEG phase toward the average EEG phase of a healthy population. The specified EEG frequency may be an intrinsic frequency as described herein. The specified EEG frequency may be a pre-selected frequency as described herein. The pre-selected frequency may be an average intrinsic frequency of a healthy population database within a specified EEG band.

In another aspect are methods for using a Transcranial Magnetic Stimulation (TMS) device for influencing an EEG phase of a subject within a specified EEG band, comprising: adjusting output of said TMS device; changing the EEG phase by repetitive firing of at least one magnetic field using said TMS device; and applying said magnetic field close to a head of the subject. '490 Patent 59:37-63.

Repetitive Transcranial Magnetic Stimulation (rTMS) refers to uses of a magnetic field administered in very short grouped pulses (microseconds in length) to a patient's head to achieve a constant train of activation over brief periods of a treatment session. These brief magnetic fields can stimulate small areas of the brain non-invasively. During a single session, about 3,000 magnetic pulses can be given over an interval of about 30 minutes. '490 Patent 63:17-24. *See also* '737 Patent 54:18-54.

In some embodiments, described are devices that provide low frequency near-sinusoidal TMS therapy by rotating at least one permanent magnet in close proximity to the subject's head. The direction of rotation relative to the subject can vary depending on the specific therapy desired. Also, the speed of rotation can be adjusted to provide the optimal therapeutic benefit. The speed adjustment itself can come from the user of the device or from a controller that uses feedback

from a bio-sensor to determine the optimal speed. ’490 Patent 66:19-26. *See also* ’737 Patent 61:12-20.

The study was conducted at two sites. In the method used in this trial, a magnetic field was adjusted to influence the Q-factor of an intrinsic frequency of each subject within the alpha-band. The magnetic field was applied close to the head of the subject. EEG readings were taken before treatment began. The magnets were in the same location and rotated in the same manner for all subjects receiving the magnetic therapy. All subjects underwent a traditional 19-lead EEG recording. A Cadwell Easy 2.1 EEG system was used to take the 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. The specific alpha frequency (pre-selected frequency) was selected from the EEG recording using a curve-fitting technique to determine the subject's intrinsic frequency of the alpha wave and to determine the Q-factor of the alpha wave. ’490 Patent 79:18-32. *See also* ’737 Patent 74:7-21.

FIG. 41 shows the results of a clinical trial utilizing the NEST device for the treatment of anxiety. This trial involved two (2) patients (subjects). Both patients received treatment with the NEST device as shown in FIG. 19, with permanent magnets arranged as shown in FIG. 16. In the method used for these patients, a magnetic field was adjusted to influence the Q-factor of an intrinsic frequency of each subject within the alpha-band. The magnetic field was applied close to the head of the subject. ’490 Patent 83:25-33. *See also* ’737 Patent 78:10-18.

VI. Coherence Value (Claim Number 19)

Further with respect to Claim 1, as amended, Katz fails to teach or suggest "adjusting output of a magnetic field to a setting that is operable to .. .influence a coherence value of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value wherein if the coherence value is higher than the target coherence value, applying at least two asynchronous magnetic fields close to the head of the subject, and wherein if the coherence value is lower than the target coherence value, applying at least one synchronized magnetic field close to a head of the subject."

The Examiner refers to a definition of "coherence" in the Office Action based on Katz. However, Applicants respectfully disagree with this characterization of the term based on the way the term is used in the claims and specification herein. Coherence, as used in the present application, refers to how closely matched are the intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band (*e.g.,* how closely matched is a first intrinsic frequency of a first site in the brain of the subject within a specified EEG band to a second intrinsic frequency of a second site in the brain of the subject within the same EEG band, at least). (See, e.g. para [0169], at least). It is expressed as a coherence value. Thus, if the two or more intrinsic frequencies are matched in frequency, a coherence value shows this matching characteristic. Likewise, if the two or more intrinsic frequencies are not matched, the coherence value expresses this. A coherence value that is higher (more coherent) would indicate that the intrinsic frequencies are more closely matched than the situation in which a coherence value is lower (indicating less coherent). ’408 Prosecution History at *738.

Katz states that a higher magnitude magnetic field increases the focus of a mean frequency, which is the equivalent of modifying the bandwidth of an intrinsic frequency to a preselected bandwidth (column 6 lines 16-61). Coherence is defined as waves with the same frequency and in phase. '408 Prosecution History at *658. *See also* '490 Prosecution History at *1625-26 (stating similar).

In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value; and (b) applying said magnetic field close to a head of the subject In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a control group; if the coherence value from step (a) is higher than the average coherence value of the control group, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the control group, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, amblyopia, or Parkinson's disease). '408 Patent 2:28-54. *See also* '408 Patent 18:18-39 (similar); '408 Patent 20:1-23 (similar for treatment of PTSD); '408 Patent 21:61-22:22 (similar for treatment of coma); '408 Patent 24:62-25:11 (similar for treatment of Parkinson's Disease); '408 Patent 26:49-27:12.

In another aspect are devices comprising a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band. '408 Patent 7:23-26.

A device as described herein may be operable to influence a coherence of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band. '408 Patent 12:9-11. *See also* '408 Patent 30:16-19.

As used herein, "amblyopia" is a neurological disorder characterized by poor or indistinct vision in a physiologically normal eye. In certain instances, the disorder results from no transmission or poor transmission of visual images to the brain for a sustained period of time. In some embodiments, subjects with amblyopia display asymmetric activity in the occipital lobe. In some embodiments, increasing the symmetry of activity in the occipital lobe decreases the symptoms of amblyopia. In some embodiments, applying a magnetic field at the alpha frequency across the whole brain improves the coherence. In some embodiments, increasing coherence lessens the effects of the amblyopia.

Disclosed herein, in certain embodiments, are methods of treating amblyopia by modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value; and (b) applying said magnetic field close to a head of the subject. In some embodiments, increasing the coherence of the subject increases the symmetry of the subject's brain. In some embodiments, increasing the symmetry of the subject's brain increases the activity in the affected visual cortex. In some embodiments, increasing the coherence of a subject's brain decreases the symptoms of amblyopia. ’408 Patent 22:56-23:14.

Provided herein is a method of modulating the electrical activity of a brain in a subject in need thereof, comprising adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. ’408 Patent 40:55-63.

Provided herein is a method of improving coherence of intrinsic frequencies within a specified EEG band among multiple locations of a brain of a subject, comprising determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a control group; if the coherence value from step (a) is higher than the average coherence value of the control group, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the control group, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. ’408 Patent 41:35-51.

Coherence analysis is carried out between Fz and Pz in the peak alpha frequency. ’408 Patent 52:37-38.

In some embodiments, at least one of the intrinsic frequency and the fitted Gaussian curve is used to determine a coherence value of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band. ’490 Patent 4:5-8. *See also* ’490 Patent 29:1-4 (similar).

In some embodiments, the device is operable to at least one of: influence the intrinsic frequency of the brain of a subject within the specified EEG band; influence a Q-factor of the intrinsic frequency; influence a coherence of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band; and influence an EEG phase between two sites in the brain of a subject of a specified EEG frequency. ’490 Patent 5:12-19. *See also* ’490 Patent 15:49-56 (similar); ’490 Patent 30:9-16 (similar).

In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value;

and (b) applying said magnetic field close to a head of the subject '490 Patent 6:48-53. *See also* '490 Patent 18:21-29 (similar); '490 Patent 31:45-50 (similar).

In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. '490 Patent 6:54-7:3. *See also* '490 Patent 31:51-67 (similar).

In another aspect are devices comprising a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band. '490 Patent 11:9-13.

In some aspects, is a device for use in treating a subject, comprising: a Transcranial Magnetic Stimulation (TMS) device; whereby the means for applying the magnetic field is capable of influencing (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of a brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band; or (d) a combination thereof. Provided herein is a method of treating depression in a subject, comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex. '490 Patent 17:64-18:12. *See also* '490 Patent 19:12-24 (similar for treatment of depression); '490 Patent 37:53-61 (similar); '490 Patent 38:44-56 (similar); '490 Patent 39:38-47 (similar); '490 Patent 40:33-45 (similar).

Provided herein is a system for treating depression comprising: a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing at least one of: (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of the brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in the brain of the subject within a specified EEG band; and (d) a EEG phase between two sites in the brain of the subject of a specified EEG frequency, and a device capable of determining the blood flow of at least one of the cortex and a lower region of the brain. '490 Patent 20:36-48.

Provided herein is a system for treating depression comprising: a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing at least one of: (a) an intrinsic frequency of a brain of the subject within a specified

EEG band; (b) a Q-factor of an intrinsic frequency of the brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in the brain of the subject within a specified EEG band; and (d) a EEG phase between two sites in the brain of the subject of a specified EEG frequency, and a device capable of determining the blood flow of at least one of the cortex, a dorsal and frontal region, and a parietal-occipital region of the brain. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex. '490 Patent 34:16-34.

In some embodiments of a device or devices as described herein, the device is operable to influence an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a Q-factor of an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a coherence of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a EEG phase of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band. '490 Patent 47:37-48.

Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected coherence value; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. '490 Patent 58:7-15.

Provided herein is a method of improving coherence of intrinsic frequencies within a specified EEG band among multiple locations of a brain of a subject, comprising determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. '490 Patent 58:56-59:6.

12. (Currently Amended) A system for treating depression in a subject comprising: a magnetic field generator adapted to apply a magnetic field to a head of the subject, wherein the magnetic field generator comprises:
a) information comprising
i) a first intrinsic frequency of a brain of the subject within a specified
EEG band,
ii) a O-factor of the intrinsic frequency,

iii) a coherence value of a second intrinsic frequency and a third intrinsic frequency, wherein the second and third intrinsic frequencies are from two different sites in the brain of the subject within the specified EEG band, or
iv) an EEG phase between two sites in the brain of the subject of a specified EEG frequency, wherein the two sites are different; '490 Prosecution History at *1799.

VII. Control the magnetic field (Claim Number 21)

"In some embodiments, the device comprises logic that controls the frequency in increments of about 0.1 Hz." '490 Patent, 5:24-25; *see also* '490 Patent, 30:21-22.

"In some embodiments of at least one aspect described above, the devices further comprise logic that controls the frequency to be any frequency between about 2 and about 20 Hz in increments of about 0.1 Hz. In some embodiments of at least one aspect described above, the devices further comprise logic that controls the frequency to be any frequency between about 2 and about 50 Hz in increments of about 0.1 Hz." '490 Patent, 11:59-65.

"In some embodiments, the device comprises logic that controls the frequency to be any frequency between about 0.5 Hz and about 100 Hz in increments of about 0.1 Hz." '490 Patent, 19:34-36; *see also* '490 Patent, 20:57-59; '490 Patent, 34:43-45;'490 Patent, 38:66-39:4.

"FIG. 7 shows an exemplary embodiment of the pMERT or NEST device. In this embodiment, a button EEG electrode is located on the concave surface of the device and a second reference electrode extends via a wire from the side of the device. The display and control buttons are located on top of the device to provide information and allow the user to adjust parameters and enter patient data." '490 Patent, 21:61-67.

"The motor **72** is coupled to the magnet **2** by a drive shaft **4**, and the magnet rotation is controlled by a controller **58** (i.e. controller subunit) that can at least monitor and/or control the rotation of the magnet **2**. Control of the rotation may include, for non-limiting example, the speed of rotation, and the acceleration and/or deceleration of rotation, the time of rotation, and the direction of rotation (e.g. clockwise, counter-clockwise)." '490 Patent, 41:64-42:4; *see also* '490 Patent, 42:10-17; '490 Patent, 42:22-30.

"The rotation of a single magnet (magnet **2** *a*, for example), may be controlled independently from and/or simultaneously with the rotation of a second magnet (magnet **2** *b*, for example) by the controller **58**. Additional magnets may be similarly added to the device. In another embodiment, a single motor is coupled to a plurality of magnets, and each of the magnets may be controlled by the controller, independently or simultaneously." '490 Patent, 42:31-38.

"In some embodiments, the speed of rotation can be set by the user or controlled using neurological feedback to provide optimal therapy." '490 Patent, 42:46-48.

"In some embodiments, the pMERT (permanent Magneto-EEG Resonant Therapy) device (i.e. the NEST device) comprises one or more powerful magnets (>5000 G each) that rotate at a specific frequency or frequencies to bring about the desired therapy. A single, dual, or multi-channel EEG is incorporated in the device to acquire a sample EEG segment and determine the alpha frequency distribution. From this information, the device controls the frequency of rotation of the magnet or magnets to deliver therapy." '490 Patent, 45:65-46:6.

"FIG. 4 shows an exemplary device in which the magnet **2** rotates so that the plane of rotation is generally perpendicular to the surface of the scalp of a subject **6** and a bio-feedback sensor and/or EEG electrode **82** *a* is used to control the speed of rotation about the rotation axis **36**. The

rotation of the magnet **2** is driven by a motor **72** which is coupled to a drive shaft **4**, and the drive shaft **4** is coupled to the magnet **2**. In some embodiments at least two EEG electrodes, **82** *a*, **82** *b* are used to control the speed of rotation, wherein at least one EEG electrode, for example EEG electrode **82** *b*, is used as a reference electrode (and/or a ground electrode). The electrodes, **82** *a*, **82** *b* may be connected to an amplifier **80** which can amplify the signal received from the electrodes, **82** *a*, **82** *b*. The magnet rotation may be controlled and/or monitored by a controller subunit (controller), **58**, which may also receive, record, and/or display the signal or signals received from the EEG electrodes **82** *a*, **82** *b*." '490 Patent, 46:7-23.

"The speed of rotation can be critical to the specific therapy that is delivered. Therefore, in some embodiments, the speed of rotation is tightly controlled. In some embodiments, the speed setting may be set by the user or may be set by a controller that uses a biological sensor as feedback to optimize the magnetic field frequency." '490 Patent, 52:42-47.

"The EEG and reference leads can be connected through a differential amplifier to a controller module that regulates the speed of at least one motor to rotate at least one magnet above the scalp." '490 Patent, 52:53-56.

"In the embodiment shown in FIG. 27, the electrodes **2782** *a*, **2782** *b*, couple by wires to a controller subunit **2758**. The controller subunit **2758** also couples to at least one magnet **2702** operable to apply a magnetic field to the subject's **2706** brain by spinning the magnet **2702** about its axis (not shown). Other NEST devices as described herein may be used and may include the EEG electrodes as described. Other magnet, magnets, and/or magnetic field configurations as described herein may be used. Other controller subunits as described herein may be used." '490 Patent, 55:62-56:4.

"Provided herein is a method comprising adjusting an output of an electric alternating current source for influencing a Q-factor a measure of frequency selectivity of a specified EEG band of a subject toward a target Q-factor of the band; and applying said electric alternating current across a head of the subject. In some embodiments of the methods, a controlled waveform CES therapy is used to influence a Q-factor of an intrinsic frequency of a patient's brain." '490 Patent, 65:9-16.

"In some embodiments, the frequency of the output current has a waveform. In some embodiments, the waveform is a sinusoidal or near-sinusoidal AC microcurrent waveform (i.e. a controlled waveform). In some embodiments, the waveform is any waveform described herein, including but not limited to a half waveform and/or a full waveform." '490 Patent, 65:53-58.

"Also, the speed of rotation can be adjusted to provide the optimal therapeutic benefit. The speed adjustment itself can come from the user of the device or from a controller that uses feedback from a bio-sensor to determine the optimal speed." '490 Patent, 66:23-27.

"FIGS. 7, **8**, and **9** show an exemplary embodiment of the pMERT (NEST) device **88**. In this embodiment, a button EEG electrode **82** *a* is located on the concave surface of the device **88** and a second reference electrode **82** *b* extends via a wire from the side of the device **88**. The display **64** and control buttons **86** (device controls) are located on top of the device **88** to provide information and allow the user to adjust parameters and enter patient data." '490 Patent, 67:6-14.

"FIG. 24 shows an example embodiment of a NEST device similar to the embodiments depicted in FIGS. 22 and/or **23** having two magnets **2402** *a*, **2402** *b* rotating about a common rotation axis applied to a subject **2406** and showing the controller subunit **2458** coupled to a drive shaft **2404** that rotates the magnets **2402** *a*, **2402** *b*. The controller subunit **2458** may contain a motor (not shown) that cooperates with the drive shaft **2404** to rotate

the magnets **2402** *a*, **2402** *b*.

FIG. 25 shows block diagram of an example embodiment of a NEST device showing example elements of the NEST device and of its controller subunit. For example the embodiment shown depicts a magnet **2502** that is mounted by a frame **2534** to a base **2536**. This allows the magnet **2502** to be held stationary as the device treats a subject whose head may be positioned near to the magnet **2502** (within the magnetic field produced by the magnet **2502**). The magnet **2502** is coupled to the controller subunit **2558** by a drive shaft **2504**. The drive shaft **2504** may couple to a motor **2572** of the controller subunit **2558** by a coupling **2578**. The coupling may allow for various magnet arrangements to be interchanged by merely decoupling the drive shaft from the controller subunit and coupling a device having another arrangement of magnets (such as, for example, those described herein). The magnet **2502** may be controlled by the controller subunit **2558** through the motor **2572** that may be driven by a motor driver **2574**. The motor driver **2574** may be coupled (directly or indirectly) to a power supply **2576**. The motor driver **2574**, which can control, for non-limiting example, the speed, direction, acceleration, etc, of the magnet **2502** through the drive shaft **2504**, can be directed and/or monitored by controls such as, for example, a device speed control **2560**, an on/off control **2562**, a display **2564**, a random/continuous control **2566**, and a high/low control **2568**. A user can adjust each of these controls, which are coupled to a processor circuit board **2570** and thus coupled to the motor driver **2574**.

Alternatively, and/or additionally, the drive shaft **2504** and/or the magnet(s) may be controlled automatically based on a prescribed treatment (time of treatment, frequency of magnet rotation, etc) that is downloaded and/or programmed into the processor circuit board **2570** from a source external or internal to the controller subunit, as previously described herein. Treatments received may be stored by the controller subunit. Additionally and/or alternatively, where EEG electrodes are also present in the device and are capable of measuring the subject's brain waves, the device may adjust the treatment automatically by a biofeedback system. Additionally and/or alternatively, where EEG electrodes are present in the device and are capable of measuring the subject's brain waves, the treatment may be chosen based on the readings of the subject's brain waves prior to the treatment. Additionally and/or alternatively, where EEG electrodes are present in the device and are capable of measuring the subject's brain waves, the treatment may be chosen automatically by the device based on the readings of the subject's brain waves prior to the treatment and based on a set of rules stored in the controller subunit. Additionally and/or alternatively, where EEG electrodes are present in the device and are capable of measuring the subject's brain waves, the controller subunit is capable of storing the output of the EEG electrodes prior to, during, and/or after treatment with the NEST device. Additionally and/or alternatively, where EEG electrodes are present in the device and are capable of measuring the subject's brain waves, the controller subunit is capable of transmitting the output of the EEG electrodes prior to, during, and/or after treatment with the NEST device. This transmitting may be real-time (during measurement), or after storage of the EEG electrode outputs and during an upload or download from the NEST device." '490 Patent, 76:65-77:67.

"The various functions or processes disclosed herein (such as, for non-limiting example, logic that performs a function or process) may be described as data and/or instructions embodied in various computer-readable media, in terms of their behavioral, register transfer, logic component, transistor, layout geometries, and/or other characteristics. The logic described herein may comprise, according to various embodiments of the invention, software, hardware, or a combination of software and hardware. The logic described herein may comprise computer-readable media. Computer-readable media in which such formatted data and/or instructions may be embodied include, but are not limited to, non-volatile storage media in various forms (e.g., optical, magnetic or semiconductor storage media) and carrier waves that may be used to transfer such formatted data and/or instructions through wireless, optical, or wired signaling media or any combination thereof. Examples of transfers of such formatted data and/or instructions by carrier

waves include, but are not limited to, transfers (uploads, downloads, e-mail, etc.) over the Internet and/or other computer networks via one or more data transfer protocols (e.g., HTTP, FTP, SMTP, etc.). When received within a computer system via one or more computer-readable media, such data and/or instruction-based expressions of components and/or processes under the ICS may be processed by a processing entity (e.g., one or more processors) within the computer system in conjunction with execution of one or more other computer programs." '490 Patent, 83:49-84:8.

"b) a processor ~~that controls~~ configured to control the magnetic field based on said subject data value, wherein the magnetic field is configured to…." '490 Prosecution History at *1861 (August 4, 2014 Notice of Allowability, p. 3).

VIII. Harmonic or sub-harmonic (Claim Number 11)

Preferably, the brain activity to be modulated is a desired EEG band, such as, for example, the brains' alpha waves, and the rTMS frequency is equal to, or a harmonic or sub-harmonic of, a non-EEG biological metric that is closest to the targeted frequency in a desired EEG band such as for example the heart rate, which is a sub-harmonic of the alpha frequency. '111 Patent, 1:47-53.

The rTMS treatment protocol will begin as a daily regimen of 30 minutes of rTMS set at a frequency which is a harmonic of the patient's heart rate which is closest to the frequency in the alpha brain wave range of 8-13 Hz. As seen in Example 1 below, if the patient's heart rate is 1.5 Hz then the 6^{th} harmonic will be set a treatment frequency of the rTMS device at 9 Hz where his alpha EEG frequency may be at 9.1 Hz or 8.9 Hz. Each patient will vary depending on his/her specific biological measurements. '111 Patent, 2:12-20.

Various bodily functions operate at frequencies that are harmonics or sub-harmonics of the brain's intrinsic frequency. For example, the heart rate is approximately the 6^{th}, 7th, 8^{th}, or 9^{th} sub-harmonic of the brain's alpha frequency at awake and the 2^{nd} or 3^{rd} sub-harmonic of delta at sleep. The breathing rate is generally the 5^{th} sub-harmonic of the heartbeat. The gastrointestinal movement frequency is approximately the 4^{th} or 5^{th} sub-harmonic of the breathing rate. '111 Patent, 2:38-46.

It is evident that it is advantageous for there to be coherence between the peak frequency of a dominant EEG activity and the nearest higher harmonic of a biological metric such as for example the resting heart rate. '111 Patent, 2:48-51.

FIG. 1 shows a patient's alpha band EEG pattern in the upper left portion (top 3 patterns) with a corresponding fast Fourier transform (FFT) appearing to the right of each pattern showing frequency peaks. The bottom left pattern is an electrocardiogram (ECG) pattern of the same patient with the corresponding higher harmonics appearing to the right of the ECG pattern. The coherence coefficient is shown in a box to the right side of the EEG graphs. The highest coherence coefficient of the alpha peak frequency with the 9^{th} harmonic of the heart rate can be seen from the top EEG pattern (Coh=0.6). The 9^{th} harmonic of the heart rate is 10.52 Hz and this is the preferred frequency for this patient's rTMS treatment for conditions such as chronic pain, ASD and Alzheimer's disease. '111 Patent, 2:57-3:3.

FIG. 2 shows a patient's delta band EEG pattern in the upper left portion (top 3 patterns) with a corresponding fast Fourier transform (FFT) appearing to the right of each pattern showing frequency peaks. The bottom left pattern is an electrocardiogram (ECG) pattern of the same patient with the corresponding higher harmonics appearing to the right of the ECG pattern. The coherence coefficient is shown in a box to the right side of the EEG graphs. The highest coherence coefficient of the delta band peak frequency with the 3rd harmonic of the heart rate can be seen from the bottom EEG pattern (Coh=0.7). The 3rd harmonic of the heart rate is 3.69 Hz and this is the preferred frequency for this patient's rTMS treatment for conditions such as insomnia and attention deficit disorders. '111 Patent, 3:4-3:17.

Providing rTMS at the frequency (or a harmonic thereof) of one of these biological signals can make use of the body's natural resonance to influence brain activity and resynchronize the heart/brain/respiratory/gastro oscillation, lower energy, and increase efficiency and stability. '111 Patent, 3:24-29.

In another embodiment of the present invention, chronic pain relief can be achieved by administering rTMS to a patient in chronic pain at a frequency that is a harmonic of the patient's heart rate preferably the 6th-10th harmonic of the heart rate. '111 Patent, 3:36-40.

In general, rTMS at 2nd or 3rd harmonic of heartbeat are used to treat insomnia and improve attention. '111 Patent, 3:56-58.

In general, rTMS at 4th or 5th harmonic of heartbeat may help control impulsive behavior in autism and many other mental disorders. '111 Patent, 3:65-67.

In a preferred embodiment of the present invention, an harmonic of a patient's heart rate is used to determine the rTMS frequency in a patient where the alpha brain wave frequency cannot be determined or which is poorly defined. An harmonic of the heart rate is chosen which most closely corresponds to a frequency within the alpha brain wave intrinsic frequency of 8-13 Hz. If the intrinsic alpha brain wave frequency of an autistic patient or an Alzheimer's patient cannot be determined or is ill-defined then an harmonic of the heart rate is chosen which is within the 8-13 Hz range. The patient is then treated with rTMS at that harmonic and the patient is monitored with EEG to determine when an intrinsic alpha brain wave frequency emerges. Then the rTMS frequency can be changed to this frequency if it is different than the original harmonic used. For example, if an autistic patient has a heart rate of 1.5 Hz and the patient's intrinsic alpha brain waves cannot be determined then the rTMS treatments are initially set to the 6th harmonic or 9 Hz. The patient is treated at this frequency until an intrinsic alpha brain wave frequency is established. rTMS treatments are then continued at the intrinsic frequency. '111 Patent, 4:37-59.

The following Table 1 shows examples of the present invention where rTMS is used to modify alpha brain waves (intrinsic frequency 8-13 Hz). Table 1 shows the heart rate, the heart frequency in Hz and a frequency of the rTMS treatment. Typically the rTMS output intensity used to treat a patient is from 10% to about 120% of the motor threshold of the patient. '111 Patent, 4:61-67.

TABLE 1

Heart Rate (beat/min)	Heart Rate in Hz	rTMS Frequncy in Hz
50	0.83	9.96
60	1.0	9.0
65	1.08	8.64
70	1.17	11.7
75	1.25	11.25
80	1.33	10.64
85	1.42	11.36
90	1.5	9.0

The following Table 2 shows examples of the present invention where rTMS is used to modify delta brain waves (intrinsic frequency <4 Hz). Table 2 shows the heart rate, the heart frequency in Hz and a frequency of the rTMS treatment. Typically the rTMS power used to treat a patient is from 10% to about 120% of the motor threshold of the patient. '111 Patent, 5:13-18.

TABLE 2

Heart Rate (beat/min)	Heart Rate in Hz	rTMS Frequncy in Hz
50	0.83	2.49
60	1.0	3.0
65	1.08	2.16
70	1.17	3.51
75	1.25	2.50
80	1.33	2.66
85	1.42	2.84
90	1.5	3.0

The following Table 3 shows examples of the present invention where rTMS is used to modify theta brain waves (intrinsic frequency 4-8 Hz). Table 3 shows the heart rate, the heart frequency in Hz and a frequency of the rTMS treatment. Typically the rTMS power used to treat a patient is from 10% to about 120% of the motor threshold of the patient. '111 Patent, 5:31-37.

TABLE 3

Heart Rate (beat/min)	Heart Rate in Hz	rTMS Frequncy in Hz
50	0.83	4.98
60	1.0	6.0
65	1.08	7.56
70	1.17	5.85
75	1.25	5.0
80	1.33	6.65
85	1.42	4.26
90	1.5	4.5

The following Table 4 shows examples of the present invention where rTMS is used to modify beta brain waves (intrinsic frequency 13-30 Hz). Table 4 shows the heart rate, the heart frequency in Hz and a frequency of the rTMS treatment. Typically the rTMS power used to treat a patient is from 10% to about 120% of the motor threshold of the patient. '111 Patent, 5:51-57.

TABLE 4

Heart Rate (beat/min)	Heart Rate in Hz	rTMS Frequncy in Hz (85% of Motor Threshhold)
50	0.83	20.7
60	1.0	32.0
65	1.08	19.44
70	1.17	32.76
75	1.25	25.0

TABLE 4-continued

Heart Rate (beat/min)	Heart Rate in Hz	rTMS Frequncy in Hz (85% of Motor Threshhold)
80	1.33	15.96
85	1.42	31.24
90	1.5	30.0

The following Table 5 shows examples of the present invention where rTMS is used to modify gamma waves (intrinsic frequency ˜40 Hz). Table 5 shows the heart rate, the heartfrequency in Hz and a frequency of the rTMS treatment. Typically the rTMS power used to treat a patient is from 10% to about 120% of the motor threshold of the patient. ’111 Patent, 6:9-15.

TABLE 5

Heart Rate (beat/min)	Heart Rate in Hz	rTMS Frequncy in Hz
50	0.83	41.5
60	1.0	54
65	1.08	75.6
70	1.17	70.2
75	1.25	50.0
80	1.33	62.51
85	1.42	71.0
90	1.5	58.5

The following Table 6 shows examples of the present invention where rTMS is used to modify Mu brain waves of the sensory motor cortex (intrinsic frequency 8-13 Hz). Table 6 shows the heart rate, the heart frequency in Hz and a frequency of the rTMS treatment. Typically the rTMS power used to treat a patient is from 10% to about 120% of the motor threshold of the patient. ’111 Patent, 6:29-35.

TABLE 6

Heart Rate (beat/min)	Heart Rate in Hz	rTMS Frequncy in Hz
50	0.83	9.13
60	1.0	10.00
65	1.08	8.64
70	1.17	11.7
75	1.25	12.5
80	1.33	10.64
85	1.42	8.52
90	1.5	10.5

“Finally, in order to provide further distinction to the claimed invention, new dependent claims

14-17 have been added to recite that the rTMS frequency is equal to, or a harmonic or sub-harmonic of, a non-EEG biological metric having a highest coherence coefficient to an intrinsic frequency in a desired EEG band." '111 Prosecution History at *68 (December 27, 2017, Amendment under 37 CFR §1.114, p. 6).

IX. In-phase/in phase (Claim Number 14)

Even a device having a magnetic phase of 0, where the magnets spin at the same frequencies, and in-phase relative to the treatment surface of the device (and/or relative to the head of the subject), may influence the EEG phase between two locations measured on the subject's head. For example, if prior to treatment, two EEG electrodes take EEG readings within an EEG band, and the frequencies are the same (or substantially so), however, the EEG readings have peaks for each electrode at different times (i.e. a non-zero EEG phase), a device as described herein may influence the EEG phase by applying a magnetic field having a magnetic phase (i.e. where the magnets move at the same frequency and in-phase with each other). '408 Patent, 38:4-16.

The tensioner assemblies in the embodiments shown in FIG. 17, FIG. 18, and FIG. 19, for non-limiting example, are configured to keep the drive belts taut during use and, therefore, ensure that the rotation of the magnets is simultaneous and generally in-phase as applied to the subject where the magnets are aligned such that each of the neutral planes of each of the three magnets are generally aligned to be parallel to the scalp of the subject. '408 Patent, 55:42-49.

Even a device having a magnetic phase of 0, where the magnets spin at the same frequencies, and in-phase relative to the treatment surface of the device (and/or relative to the head of the subject), may influence the EEG phase between two locations measured on the subject's head. For example, if prior to treatment, two EEG electrodes take EEG readings within an EEG band, and the frequencies are the same (or substantially so), however, the EEG readings have peaks for each electrode at different times (i.e. a non-zero EEG phase), a device as described herein may influence the EEG phase by applying a magnetic field having a magnetic phase (i.e. where the magnets move at the same frequency and in-phase with each other). '490 Patent, 55:24-36.

The tensioner assemblies in the embodiments shown in FIG. 17, FIG. 18, and FIG. 19, for non-limiting example, are configured to keep the drive belts taut during use and, therefore, ensure that the rotation of the magnets is simultaneous and generally in-phase as applied to the subject where the magnets are aligned such that each of the neutral planes of each of the three magnets are generally aligned to be parallel to the scalp of the subject. '490 Patent, 73:4-11.

X. Intrinsic Frequency (Claim Number 12)

"In one aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject." '408 Patent, 1:40-45.

"In another aspect are methods of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic

frequency of a control group; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, amblyopia or Parkinson's disease)." '408 Patent, 1:46-67.

"In another aspect are methods of using a Transcranial Magnetic Stimulation (TMS) device for influencing an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject." '408 Patent, 2:55-61.

"In some embodiments, a method is provided for treating Parkinson's Disease in a subject, comprising adjusting an intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein the magnetic field comprises at least one of (a) a single frequency; (b) a plurality of frequencies within a specified EEG band; and (c) an intrinsic frequency of a brain of the subject within a specified EEG band. In some embodiments, any of the devices described herein may be used to treat Parkinson's Disease." '408 Patent, 3:24-32.

"In some embodiments, the methods comprise measuring EEG data of two sites in the brain of the subject, and calculating the EEG phase between the two sites in the brain of a subject. The specified EEG frequency may be an intrinsic frequency as described herein. The specified EEG frequency may be a target frequency as described herein. The target frequency may be an average intrinsic frequency of a control group within a specified EEG band." '408 Patent, 4:3-10.

"In some embodiments, the target and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies in the specified EEG band. In some embodiments the target and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies across a plurality of EEG bands. In some embodiments the specified EEG band is the Alpha band. In some embodiments the specified EEG band is the Beta band." '408 Patent, 5:4-10.

"In some embodiments of at least one aspect described above, the varying frequencies are frequencies hopping around within a pre-determined frequency range. In some embodiments of at least one aspect described above, the varying frequencies are frequencies hopping around an intrinsic frequency within a specified EEG band of a control group. In some embodiments of at least one aspect described above, the target frequency is an average intrinsic frequency of a control group within a specified EEG band. In some embodiments of at least one aspect described above, the target frequency is an intrinsic frequency of a brain of the subject within a specified EEG band." '408 Patent, 5:35-46.

"In another aspect are devices comprising a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing an intrinsic frequency of a brain of the subject within a specified EEG band." '408 Patent, 7:12-16.

"Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing an intrinsic frequency of an EEG band of a subject toward a target frequency of the EEG band; and applying said output current across a head of the subject." '408 Patent, 10:63-67.

"In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject." '408 Patent, 11:1-3.

"In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject." '408 Patent, 11:4-6.

"Provided herein is a method comprising determining the intrinsic frequency of the EEG band of the subject; and comparing the intrinsic frequency to the target frequency of the EEG band, wherein the target frequency is an average intrinsic frequency of the EEG band of a control group, wherein if the intrinsic frequency is higher than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject, and if the intrinsic frequency is lower than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject." '408 Patent, 11:10-22.

"In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject.
In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject." '408 Patent, 11:35-40.

"In some embodiments, influencing an intrinsic frequency may include influencing harmonics of the target intrinsic frequency of the specified EEG band. In some embodiments, the target intrinsic frequency is a harmonic of the peak intrinsic frequency of a specified EEG band. In some embodiments, influencing the target intrinsic frequency includes applying harmonic frequencies of the target intrinsic frequency. In some embodiments, the varying frequencies comprise harmonic frequencies of a single frequency. The single frequency may comprise the target intrinsic frequency." '408 Patent, 11:61-12:3.

"In some embodiments, a device as described herein is operable to influence an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a Q-factor of an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a coherence of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band."

’408 Patent, 12:4-11.

“The method or methods may further comprise determining the intrinsic frequency from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode. In some embodiments, determining the intrinsic frequency may comprise removing the reference signal detected by the second electrode from the electrical brain activity detected by the first electrode. The method or methods may further comprise determining the Q-factor of an intrinsic frequency of the specified EEG band from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode. In some embodiments, determining the Q-factor of an intrinsic frequency of the specified EEG band comprises ascertaining the Q-factor from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode.” ’408 Patent, 12:33-48.

“In some embodiments of the methods described herein, the method or methods may comprise locating a first electrode operable to detect electrical brain activity on the subject in at least a portion of the ear canal of the subject. The method or methods may further comprise locating a second electrode operable to detect a reference signal on the subject. The method or methods may further comprise determining the intrinsic frequency from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode.” ’408 Patent, 12:49-58.

“The specified EEG frequency may be an intrinsic frequency as described herein. The specified EEG frequency may be a target frequency as described herein. The target frequency may be an average intrinsic frequency of a control group within a specified EEG band.” ’408 Patent, 14:21-25.

“In some aspects, is a device for use in modulating the electrical activity of a brain in a subject in need thereof, comprising: a Transcranial Magnetic Stimulation (TMS) device; whereby the means for applying the magnetic field is capable of influencing (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of a brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band; or (d) a combination thereof.” ’408 Patent, 14:33-42.

“FIG. 5 shows a sample EEG segment for a subject before therapy is delivered. The block on the left shows a time series EEG while the subject is sitting at rest with eyes closed. The block in the center shows the energy across the frequency spectrum for the sampled EEG. The vertical line drawn through the peaks is at 9.1 Hz, the subject's intrinsic alpha frequency. The circle at the right shows the distribution of EEG energy at the intrinsic alpha frequency throughout the scalp, looking down on the top of the subject's head. In the circle representation, the majority of the EEG energy at the alpha frequency is concentrated at the back of the brain.” ’408 Patent, 15:5-15.

“FIG. 6 is similar to FIG. 5, except the EEG was sampled immediately following therapy. In this, it can be seen that the energy associated with the intrinsic alpha frequency has increased significantly. From the circle representation on the right, it can be seen that the distribution of

energy at the intrinsic alpha frequency throughout the head is more uniform, though the majority of energy is still concentrated at the back of the brain." '408 Patent, 15:16-23.

"FIG. 12 shows an example of the Q-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The Q-factor is defined as the ratio of $f_0/\Delta f$. As can be seen, when ΔF decreases for a given f_0, the Q-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases." '408 Patent, 15:49-59.

"Methods and devices described herein gently "tune" the brain and affect mood, focus, and cognition of subjects. In one aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject." '408 Patent, 17:32-38.

"In another aspect are methods of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject." '408 Patent, 17:39-55.

"In another aspect are methods of using a Transcranial Magnetic Stimulation (TMS) device for influencing an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject." '408 Patent, 18:40-46.

"Disclosed herein, in certain embodiments, are methods of treating PTSD by altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific

magnetic field has a frequency higher than the intrinsic frequency of the subject." '408 Patent, 19:27-44.

"Disclosed herein, in certain embodiments, are methods of treating PTSD by using a TMS device to influence an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject." '408 Patent, 20:24-30.

"Disclosed herein, in certain embodiments, are methods of treating a coma by altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject." '408 Patent, 21:16-33.

"Disclosed herein, in certain embodiments, are methods of treating a coma by using a TMS device to influence an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject." '408 Patent, 22:23-29.

"Disclosed herein, in certain embodiments, are methods of treating amblyopia by using a TMS device to influence an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject." '408 Patent, 23:15-21.

"Disclosed herein, in certain embodiments, are methods of treating Parkinson's disease by altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject. In some embodiments, stimulating a subject's intrinsic frequency comprises

accentuating a non-harmonic frequency in the alpha band. In some embodiments, stimulating a subject's intrinsic frequency comprises shifting the subject's alpha frequency." '408 Patent, 24:12-33.

"Disclosed herein, in certain embodiments, are methods of treating Parkinson's disease by using a TMS device to influence an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject." '408 Patent, 25:12-19.

"Disclosed herein, in certain embodiments, are methods of improving cognitive performance by using a TMS device to influence an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject." '408 Patent, 27:13-20.

In some embodiments, the intrinsic frequency of the subject is an alpha frequency of a brain of the subject. '408 Patent, 29:32-33.

"FIG. 5 shows a sample EEG segment for a subject before therapy is delivered. The block on the left shows a time series EEG while the subject is sitting at rest with eyes closed. The block in the center shows the energy across the frequency spectrum for the sampled EEG. The vertical line drawn through the peaks is at 9.1 Hz, the subject's intrinsic alpha frequency. The circle at the right shows the distribution of EEG energy at the intrinsic alpha frequency throughout the head, looking down on the top of the subject's head. In the circle representation, the majority of the EEG energy at the alpha frequency is concentrated at the back of the brain." '408 Patent, 29:52-62.

"FIG. 6 is similar to FIG. 5, except the EEG was sampled immediately following therapy. In this, it can be seen that the energy associated with the intrinsic alpha frequency has increased significantly. From the circle representation on the right, it can be seen that the distribution of energy at the intrinsic alpha frequency throughout the head is more uniform, though the majority of energy is still concentrated at the back of the brain." '408 Patent, 29:63-30:3.

"In some embodiments of a device or devices as described herein, the device is operable to influence an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a Q-factor of an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a coherence of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a EEG phase of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band." '408 Patent, 30:11-22.

"The specified EEG frequency may be an intrinsic frequency as described herein. The specified EEG frequency may be a target frequency as described herein. The target frequency may be an average intrinsic frequency of a control group within a specified EEG band." '408 Patent, 37:18-

22.

"A single or a plurality of electrodes may be placed on the scalp for coherence measurement, phase measurement, intrinsic frequency measurement, and/or Q-factor measurement. Noise from scalp movement and/or resistivity from the skull may be filtered from the signal (or signals) received from the EEG electrodes, however, such filtering may not be necessary. Curve smoothing may be applied to the signal (or signals) received from the EEG electrodes, however, such curve smoothing may not be necessary. Using any of the EEG recording means noted herein, multiple signal recordings may be taken and combined to determine, for non-limiting example, a coherence measurement, an intrinsic frequency measurement, and/or a Q-factor measurement. An EEG electrode cap may be used, and signals from one or more electrodes of the cap may be used as described herein to determine an intrinsic frequency, a Q-factor, or coherence." '408 Patent, 39:16-32.

"Provided herein is a method of modulating the electrical activity of a brain in a subject in need thereof, comprising adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a target intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. In some embodiments, influencing an intrinsic frequency may include influencing harmonics of the target intrinsic frequency of the specified EEG band. In some embodiments, the target intrinsic frequency is a harmonic of the peak intrinsic frequency of a specified EEG band. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency that can be represented in the frequency domain by an impulse function. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency having no variation (standard of deviation around the target frequency is 0). In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 1% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 5% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 10% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 10% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 15% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 20% of the target frequency." '408 Patent, 40:8-45.

"Provided herein is a method of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising determining the intrinsic frequency of the subject within the specified EEG band; comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic

field has a frequency lower than the intrinsic frequency of the subject; and if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method." '408 Patent, 40:64-41:15.

"In another aspect are methods for influencing an EEG phase of a specified EEG frequency between multiple locations of a brain of a subject, comprising determining the EEG phase the between at least two locations measured on the head of the subject; comparing the EEG phase to an average EEG phase of a control group; and applying a magnetic field close to a head of the subject. Applying the magnetic field may influences the determined EEG phase toward the average EEG phase of a control group. The specified EEG frequency may be an intrinsic frequency as described herein. The specified EEG frequency may be a target frequency as described herein. The target frequency may be an average intrinsic frequency of a control group within a specified EEG band." '408 Patent, 42:21-33.

"In some embodiments of at least one aspect described above, the target intrinsic frequency with the specified EEG band is from about 0.5 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the target intrinsic frequency with the specified EEG band is from about 1 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the target intrinsic frequency with the specified EEG band is not greater than about 50 Hz. In some embodiments of at least one aspect described above, the target intrinsic frequency with the specified EEG band is not greater than about 30 Hz. In some embodiments of at least one aspect described above, the target intrinsic frequency with the specified EEG band is not greater than about 20 Hz. In some embodiments of at least one aspect described above, the target intrinsic frequency with the specified EEG band is not greater than about 10 Hz. In some embodiments of at least one aspect described above, the target intrinsic frequency with the specified EEG band is greater than about 3 Hz. In some embodiments of at least one aspect described above, the target intrinsic frequency with the specified EEG band is greater than about 1 Hz." '408 Patent, 42:50-43:3.

"In some embodiments, of at least one aspect described above, the target intrinsic frequency with the specified EEG band is up to about 25 Hz. As used herein, the term "about" when referring to a frequency can mean variations of 0.1 Hz-0.2 Hz, 0.1 Hz to 0.5 Hz, 0.5 Hz to 1 Hz, or 1 Hz to 5 Hz." '408 Patent, 43:4-8.

"In some embodiments, the target and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies in the specified EEG band. In some embodiments the target and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies across a plurality of EEG bands. In some embodiments the specified EEG band is the Alpha band. In some embodiments the specified EEG band is the Beta band." '408 Patent, 43:9-15.

"The method or methods may further comprise determining the intrinsic frequency from: the electrical brain activity detected by the first electrode, and the reference signal detected by the

second electrode." '408 Patent, 43:33-37.

"The method or methods may further comprise determining the intrinsic frequency from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode." '408 Patent, 43:43-47.

"The methods provided herein may comprise placing a plurality of electrodes on the scalp for coherence measurement, intrinsic frequency measurement, and/or Q-factor measurement. The methods provided herein may comprise filtering from the signal (or signals) received from the EEG electrodes noise from scalp movement and/or resistivity from the skull. The methods provided herein may comprise smoothing the signal curve received and/or determined from the EEG electrodes. The methods provided herein may comprise determining from multiple signal recordings: a coherence measurement, an intrinsic frequency measurement, and/or a Q-factor measurement using any of the EEG recording means noted herein. An EEG electrode cap may be used, and signals from one or more electrodes of the cap may be used as described herein to determine an intrinsic frequency, a Q-factor, or coherence." '408 Patent, 44:36-51.

"Measuring the EEG signal from the subject's brain (i.e. measuring EEG data of the subject) may be done prior to and/or after the application of the magnetic field to the subject. The method may comprise receiving the EEG signals (i.e. receiving the reference signal from the reference electrode and receiving the brain activity from the first electrode) prior to application of the magnetic field to the subject's brain (or a portion thereof). The method may comprise recording the EEG signals prior to application of the magnetic field to the subject's brain (or a portion thereof). The EEG signals (i.e. receiving the reference signal from the reference electrode and receiving the brain activity from the first electrode) received and/or recorded prior to application of the magnetic field to the subject's brain (or a portion thereof) may be used in determining at least one of the intrinsic frequency of a specified EEG band of the subject, the Q-factor of an intrinsic frequency of a specified EEG band of the subject, the phase of the intrinsic frequencies of a specified EEG band of the subject, and the coherence of the intrinsic frequencies of a specified EEG band of the subject measured at multiple brain locations. The method may comprise receiving the EEG signals (i.e. receiving the reference signal from the reference electrode and receiving the brain activity from the first electrode) following (or after) application of the magnetic field to the subject's brain (or a portion thereof)." '408 Patent, 45:5-25.

"The method may comprise recording the EEG signals (i.e. the reference signal from the reference electrode and the brain activity from the first electrode) following or after application of the magnetic field to the subject's brain (or a portion thereof). The EEG signals received and/or recorded (i.e. the reference signal from the reference electrode and the brain activity from the first electrode) following (or after) application of the magnetic field to the subject's brain (or a portion thereof) may be used in determining at least one of the post-treatment intrinsic frequency of a specified EEG band of the subject, the post-treatment Q-factor of an intrinsic frequency of a specified EEG band of the subject, the post-treatment phase of the intrinsic frequencies of a specified EEG band of the subject, and the post-treatment coherence of the intrinsic frequencies of a specified EEG band of the subject measured at multiple brain locations." '408 Patent, 45:25-45.

"Determining the intrinsic frequency may comprise removing the reference signal detected by the second electrode from the electrical brain activity detected by the first electrode. Determining the Q-factor of an intrinsic frequency of the specified EEG band comprises ascertaining the Q-factor from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode by removing the reference signal detected by the second electrode from the electrical brain activity detected by the first electrode and calculating the Q-factor from the intrinsic frequency fo and the Δf as shown in FIG. 12." '408 Patent, 45:45-55.

"Provided herein is a method comprising adjusting an output of an electric alternating current source for influencing an intrinsic frequency of a EEG band of a subject toward a target frequency of the EEG band; and applying said electric alternating current across a head of the subject. In some embodiments of the methods, a CES therapy is used to influence the intrinsic frequency of a patient's brain toward a target frequency as measured by EEG." '408 Patent, 47:14-21.

"Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing an intrinsic frequency of an EEG band of a subject toward a target frequency of the EEG band; and applying said output current across a head of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to the target frequency. In some embodiments, the method further comprises determining the intrinsic frequency of the EEG band of the subject; and comparing the intrinsic frequency to the target frequency of the EEG band, wherein the target frequency is an average intrinsic frequency of the EEG bands of a control group, wherein if the intrinsic frequency is higher than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject, and if the intrinsic frequency is lower than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject." '408 Patent, 47:22-46.

"FIG. 12 shows an example of the Q-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The Q-factor is defined as the ratio of $f_0/\Delta f$. As can be seen, when ΔF decreases for a given f_0, the Q-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases." '408 Patent, 47:54-64.

"In some embodiments, the intrinsic frequency is the alpha frequency of the patient's brain measured by EEG." '408 Patent, 48:30-32.

"EEG data during treatments are recorded and individualized according to the alpha EEG intrinsic frequency (8-13 Hz). The precision of the stimulus rate can be refined to the level of 10% of a hertz. It is determined on each patient's average alpha frequency, obtained from 3

central EEG leads (C3, C4, and Cz)." '408 Patent, 51:44-49.

"Raw EEG data are edited offline by an experienced technician who is blind to the treatment conditions to eliminate any significant (≧3_arc) eye movements or any other type of apparent artifact. Ten to twenty-four artifact-free epochs (1,024 data points per epoch) in each recording channel are calculated by a fast Fourier transform (FFT) routine to produce a power spectrum with 0.2 Hz frequency resolution. The intrinsic frequency of alpha EEG is defined as the mean peak frequency (Fp) of 3 central leads (C3, C4, and Cz). EEG variables used in the analysis included power density (Pwr), peak frequency (Fp), Fp longitudinal coherence, and frequency selectivity (Q). See Jin Y et al. Alpha EEG predicts visual reaction time. *Int J. Neurosci.* 116: 1035-44 (2006), which is incorporated by reference in its entirety." '408 Patent, 52:29-36.

"FIG. 12 shows an example of the Q-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The Q-factor is defined as the ratio of $f_0/\Delta f$. As can be seen, when ΔF decreases for a given f_0, the Q-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases." '408 Patent, 52:48-59.

"An effect of use of a NEST (i.e. pMERT) device using a method provided herein was shown to lower blood pressure in a female patient. The patient, originally using a NEST to treat anxiety, complained of a moderate tension headache and her blood pressure was taken, and read at 110/90 mmHg. A NEST device was set at a fixed specified frequency equal to an intrinsic frequency within her alpha EEG band and the magnetic field emanating from the device was applied to the patient's head (cerebral cortex). During treatment using the NEST device, three consecutive blood pressure measurements were taken at ten minute intervals, showing 110/85 mmHg, 100/82 mmHg, and 100/70 mmHg, respectively. An hour after treatment with the NEST device had ceased, the patient's tension headache returned, and her blood pressure was measured, reading 110/90 mmHg." '408 Patent, 52:65-53:12.

"An effect of use of a modified rTMS device according to the methods and device descriptions provided herein was shown to reduce the symptoms of fibromyalgia. The patient complained of chronic widespread pain and tenderness to light touch, and was diagnosed with fibromyalgia. The NEST device was used to tune an intrinsic frequency (of the patient's alpha wave). Following treatment, the patient reported a reduction of the symptoms of fibromyalgia." '408 Patent, 60:42-49.

"FIGS. 31 and 32 show the results of a clinical trial utilizing the NEST device and methods for the treatment of depression as provided herein. A device was used such as shown in FIG. 19, with permanent magnets arranged as shown in FIG. 16. In the method used in this trial, a magnetic field was adjusted to influence the Q-factor of an intrinsic frequency of each individual within the alpha-band. The magnetic field was applied close to the head of the subject. EEG readings were taken before treatment began. A Cadwell Easy 2.1 EEG system was used to take a 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. Patients were placed in one of three groups: constant frequency, random

frequency, or sham, with equal probability for each group. Patients received treatment every weekday for 30 days. EEG readings were taken after treatment at least on a weekly basis. If the patient was in the "constant frequency" group, the NEST was set to rotate the magnets at the intrinsic frequency. If the patient was in the "random frequency" group, the NEST was set to rotate the magnets at random frequencies between 6 Hz and 12 Hz, changing frequencies once per second. If the patient was in the "SHAM" group, the magnets in the NEST were replaced with steel cylinders, thereby imparting no magnetic field to a head of the patient. The patients in this group were divided into two subgroups with equal probability, with one group having the cylinders rotated at the intrinsic frequency and the other group having the cylinders rotated at random frequencies as noted above." '408 Patent, 61:47-62:7.

"FIG. 33 shows the results of a clinical trial utilizing the NEST device for the treatment of anxiety. This trial involved two (2) patients (subjects). Both patients received treatment with the NEST device as shown in FIG. 19, with permanent magnets arranged as shown in FIG. 16. In the method used for these patients, a magnetic field was adjusted to influence the Q-factor of an intrinsic frequency of each individual within the alpha-band. The magnetic field was applied close to the head of the subject. EEG readings were taken before treatment began. A Cadwell Easy 2.1 EEG system was used to take a 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. Both patients were treated with a constant frequency, wherein for each patient the NEST was set to rotate the magnets at the intrinsic frequency detected for that patient." '408 Patent, 62:43-58.

"b. The subject lays with his/her head in the device for 30 minutes while a gentle, low energy, low frequency magnetic field is generated above the scalp. The frequency is at or near the subject's alpha frequency." '408 Patent, 63:54-57.

"In one aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected or target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject." '490 Patent, 1:40-45. *See also* '737 Patent 1:39-44.

"Provided herein are methods of treating a subject, comprising determining the intrinsic frequency (f) of the subject within the specified EEG band by: obtaining EEG data of the subject's brain; removing any DC component in the signal; performing a Fast Fourier Transformation, X(f), on the EEG data; and achieving a fitted Gaussian curve, A(f), of the EEG data by: using the equation $A(f)=Ge^{(-(f-s)^2/2d^2)}$ (also depicted in FIG. 31), wherein G is gain, d is standard deviation, and s is the mean frequency based on the specified EEG band, and determining a goodness of fit measure by optimizing using the following equation

$$H(X, A) = \sum_{f=s-1\ Hz}^{s+1\ Hz} |X(f) - A(f)|$$

(also depicted in FIG. 32), by: estimating a first mean frequency, a first standard of deviation, and first gain for the first optimizing loop, shifting the gain, G, up or down slightly from the first gain, determining a new gain resulting in a better fit than that of the first gain, shifting the standard of deviation, d, up or down slightly from the first standard of deviation, determining a new standard of deviation resulting in a better fit than that of the first standard of deviation, shifting the mean frequency, s, up or down slightly from the first mean frequency, determining a

new mean frequency resulting in a better fit than that of the first mean frequency, and repeating steps 2), 3), and 4), in which the first gain, the first standard of deviation, and the first mean frequency are replaced with a second gain, a second standard of deviation, and a second mean frequency, respectively, until the three parameters are optimized, comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a healthy population database; if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the healthy population database, shifting down the intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein said magnetic field has a frequency lower than the intrinsic frequency of the subject; and if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the healthy population database, shifting up the intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein said magnetic field has a frequency higher than the intrinsic frequency of the subject." '490 Patent, 1:47-2:25. *See also* '737 Patent 1:45-2:23.

"Provided herein is a method of using a Transcranial Magnetic Stimulation (TMS) device for influencing an intrinsic frequency of a subject within a specified EEG band, comprising: adjusting output of said TMS device; changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and applying said magnetic field close to a head of the subject, wherein the intrinsic frequency of the subject within the specified EEG band is determined by: obtaining EEG data of the subject's brain; removing any DC component in the signal; performing a Fast Fourier Transformation, X(f), on the EEG data; and achieving a fitted Gaussian curve, A(f), of the EEG data by: using the equation $A(f)=Ge^{(-(f-s)^2/2d^2)}$ (also depicted in FIG. 31), wherein G is gain, d is standard deviation, and s is the mean frequency based on the specified EEG band, and determining a goodness of fit measure by optimizing using the following equation

$$H(X, A) = \sum_{f=s-1\ Hz}^{s+1\ Hz} |X(f) - A(f)|$$

(also depicted in FIG. 32), by: estimating a first mean frequency, a first standard of deviation, and first gain for the first optimizing loop, shifting the gain, G, up or down slightly from the first gain, determining a new gain resulting in a better fit than that of the first gain, shifting the standard of deviation, d, up or down slightly from the first standard of deviation, determining a new standard of deviation resulting in a better fit than that of the first standard of deviation, shifting the mean frequency, s, up or down slightly from the first mean frequency, determining a new mean frequency resulting in a better fit than that of the first mean frequency, and repeating steps 2), 3), and 4), in which the first gain, the first standard of deviation, and the first mean frequency are replaced with a second gain, a second standard of deviation, and a second mean frequency, respectively, until the three parameters are optimized." '490 Patent, 2:26-64. *See also* '737 Patent 2:24-62; '490 Patent, 4:43-5:11.

"In some embodiments, the method comprises: (a) locating a first electrode operable to detect electrical brain activity on the subject in at least one of an area of low electrical resistivity on a subject, and an area with substantially no electrical impulse interference on a subject; (b) locating a second electrode operable to detect a reference signal on the subject; and (c) determining the intrinsic frequency from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode." '490 Patent, 3:20-28. *See also* '737 Patent 3:17-25.

"In another aspect are methods of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a healthy population database; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the healthy population database, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the healthy population database, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject." '490 Patent, 6:8-25; '737 Patent 6:4-22.

"In another aspect are methods of using a Transcranial Magnetic Stimulation (TMS) device for influencing an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject." '490 Patent, 7:4-10. *See also* '737 Patent 7:1-7.

"In some embodiments of at least one aspect described above, the step of applying the magnetic field is for a pre-determined cumulative treatment time. In some embodiments of at least one aspect described herein, the pre-selected or target intrinsic frequency with the specified EEG band is from about 0.5 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 1 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 50 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 30 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 20 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 10 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 3 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 1 Hz. In some embodiments, of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is up to about 25 Hz. As used herein, the term "about" when referring to a frequency can mean variations of 0.1 Hz to 0.2 Hz, 0.1 Hz to 0.5 Hz, 0.5 Hz to 1 Hz, or 1 Hz to 5 Hz. In some embodiments, applying of the magnetic field is to the motor cortex of the subject." '490 Patent, 8:21-52. *See also* ' 737 Patent 8:15-46.

"In some embodiments, the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies in the specified EEG band. In some embodiments the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies across a plurality of EEG bands. In some embodiments the specified EEG band is the Alpha

band. In some embodiments the specified EEG band is the Beta band." '490 Patent, 8:53-60. *See also* '737 Patent 8:47-54.

"Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing an intrinsic frequency of an EEG band of a subject toward a target frequency of the EEG band; and applying said output current across a head of the subject.
In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject.
In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject."
'490 Patent, 14:49-62; '737 Patent 14:45-55.

"In some embodiments, influencing an intrinsic frequency may include influencing harmonics of the pre-selected intrinsic frequency of the specified EEG band. In some embodiments, the pre-selected intrinsic frequency is a harmonic of the peak intrinsic frequency of a specified EEG band. In some embodiments, influencing the pre-selected intrinsic frequency includes applying harmonic frequencies of the pre-selected intrinsic frequency. In some embodiments, the varying frequencies comprise harmonic frequencies of a single frequency. The single frequency may comprise the pre-selected intrinsic frequency." '490 Patent, 15:38-48; '737 Patent 15:33-43.

"In some embodiments, a device as described herein is operable to influence an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a Q-factor of an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a coherence of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band."
'490 Patent, 15:49-56; '737 Patent 15:44-51.

"The method or methods may further comprise determining the intrinsic frequency from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode. In some embodiments, determining the intrinsic frequency may comprise removing the reference signal detected by the second electrode from the electrical brain activity detected by the first electrode." '490 Patent, 16:11-18. *See also* '737 Patent 16:13-21.

"The method or methods may further comprise determining the intrinsic frequency from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode." '490 Patent, 16:32-36. *See also* '737 Patent 16:27-30.

"The specified EEG frequency may be an intrinsic frequency as described herein. The specified EEG frequency may be a pre-selected frequency as described herein. The pre-selected frequency may be an average intrinsic frequency of a healthy population database within a specified EEG band." '490 Patent, 17:3-8. *See also* '490 Patent, 17:58-63. *See also* '737 Patent 17:53-58.

"In some embodiments, the method further comprises repeating the applying step after an interval about 6 hours to about 14 days. In some embodiments, the method further comprises: (a) locating a first electrode operable to detect electrical brain activity on the subject in at least one of an area of low electrical resistivity on a subject, and an area with substantially no electrical

impulse interference on a subject; (b) locating a second electrode operable to detect a reference signal on the subject; and (c) determining the intrinsic frequency from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode." '490 Patent, 18:65-19:9. *See also* '737 Patent 18:35-47.

"Provided herein is a method to treat depression comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject." '490 Patent, 19:55-65.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject." '490 Patent, 19:66-20:6.

"In some embodiments, the system comprises logic that calculates information from EEG data collected from the subject within a specified EEG band, wherein said information comprises at least one of items listed below: (a) at least one intrinsic frequency; (b) Q-factor of the at least one intrinsic frequency; (c) a coherence value of intrinsic frequencies; (d) an EEG phase; and (e) any combination thereof." '490 Patent, 20:63-21:2. *See also* '490 Patent 19:8-13.

"FIG. 12 shows an example of the Q-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The Q-factor is defined as the ratio of $f_0 \Delta f$. As can be seen, when ΔF decreases for a given f_0, the Q-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases." '490 Patent, 22:19-29. *See also* '737 Patent 20:30-41.

"FIG. 36 *a* shows the Fast Fourier Transformation curve of EEG data of an example EEG waveform for a subject having Major Depressive Disorder, also depicted in FIG. 35 *b*, and shows the fitted Gaussian curve of the Fast Fourier Transformation curve having an intrinsic frequency of 8.56 Hz, and having a delta f (Δf) of 0.51 Hz." '490 Patent, 23:59-64. *See also* '737 Patent 22:6-11.

"FIG. 36 *b* shows the Fast Fourier Transformation curve of EEG data of an example EEG waveform for a subject who does not have Major Depressive Disorder, also depicted in FIG. 35 *d*, and shows the fitted Gaussian curve of the Fast Fourier Transformation curve having an intrinsic frequency of 9.27 Hz, and having a delta f (Δf) of 1.06 Hz." '490 Patent, 23:65-24:3. *See also* '737 Patent 22:13-17.

"Provided herein are methods of treating a subject, comprising determining the intrinsic frequency (f) of the subject within the specified EEG band by: obtaining EEG data of the subject's brain; removing any DC component in the signal; performing a Fast Fourier Transformation the EEG data to determine a FFT curve X(f); and achieving a fitted Gaussian curve, A(f), of a local maximum of the FFT curve X(f) by: using the equation $A(f)=Ge^{(-(f-s)^2/2d^2)}$ (also depicted in FIG. 31), wherein G is gain, d is standard deviation, and s is the mean frequency based on the specified EEG band, and determining a goodness of fit measure by optimizing using the following equation

$$H(X, A) = \sum_{f=s-1\ Hz}^{s+1\ Hz} |X(f) - A(f)|$$

(also depicted in FIG. 32), by: estimating a first mean frequency, a first standard of deviation, and first gain for the first optimizing loop, shifting the gain, G, up or down slightly from the first gain, determining a new gain resulting in a better fit than that of the first gain, shifting the standard of deviation, d, up or down slightly from the first standard of deviation, determining a new standard of deviation resulting in a better fit than that of the first standard of deviation, shifting the mean frequency, s, up or down slightly from the first mean frequency, determining a new mean frequency resulting in a better fit than that of the first mean frequency, and repeating steps 2), 3), and 4), in which the first gain, the first standard of deviation, and the first mean frequency are replaced with a second gain, a second standard of deviation, and a second mean frequency, respectively, until the three parameters are optimized, comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a healthy population database; if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the healthy population database, shifting down the intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein said magnetic field has a frequency lower than the intrinsic frequency of the subject; and if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the healthy population database, shifting up the intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein said magnetic field has a frequency higher than the intrinsic frequency of the subject." '490 Patent, 24:59-25:39. *See also* '737 Patent 23:1-26:45.

"In some embodiments, the method comprises comparing the intrinsic frequency to an average intrinsic frequency of a healthy population database; if the intrinsic frequency is higher than the average intrinsic frequency of the healthy population database, shifting down the intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein said magnetic field has a frequency lower than the intrinsic frequency of the subject; and if the intrinsic frequency is lower than the average intrinsic frequency of the healthy population database, shifting up the intrinsic frequency of the subject by applying a magnetic field close to a head of the subject, wherein said magnetic field has a frequency higher than the intrinsic frequency of the subject." '490 Patent, 26:4-17. *See also* '737 Patent 24:53-64.

"Provided herein is a method of using a Transcranial Magnetic Stimulation (TMS) device for influencing an intrinsic frequency of a subject within a specified EEG band, comprising: adjusting output of said TMS device; changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and applying said magnetic field close to a head of the subject, wherein the intrinsic frequency of the subject within the specified

EEG band is determined by: obtaining EEG data of the subject's brain; removing any DC component in the signal; performing a Fast Fourier Transformation the EEG data to determine a FFT curve X(f); and achieving a fitted Gaussian curve, A(f), of a local maximum of the FFT curve X(f) by: using the equation $A(f)=Ge^{(-(f-s)^2/2d^2)}$ (also depicted in FIG. 31), wherein G is gain, d is standard deviation, and s is the mean frequency based on the specified EEG band, and determining a goodness of fit measure by optimizing using the following equation

$$H(X, A) = \sum_{f=s-1\ Hz}^{s+1\ Hz} |X(f) - A(f)|$$

(also depicted in FIG. 32), by: estimating a first mean frequency, a first standard of deviation, and first gain for the first optimizing loop, shifting the gain, G, up or down slightly from the first gain, determining a new gain resulting in a better fit than that of the first gain, shifting the standard of deviation, d, up or down slightly from the first standard of deviation, determining a new standard of deviation resulting in a better fit than that of the first standard of deviation, shifting the mean frequency, s, up or down slightly from the first mean frequency, determining a new mean frequency resulting in a better fit than that of the first mean frequency, and repeating steps 2), 3), and 4), in which the first gain, the first standard of deviation, and the first mean frequency are replaced with a second gain, a second standard of deviation, and a second mean frequency, respectively, until the three parameters are optimized." '490 Patent, 26:18-57. *See also* '737 Patent 24:65-25:38.

"In some embodiments, the method comprises: (a) locating a first electrode operable to detect electrical brain activity on the subject in at least one of an area of low electrical resistivity on a subject, and an area with substantially no electrical impulse interference on a subject; (b) locating a second electrode operable to detect a reference signal on the subject; and (c) determining the intrinsic frequency from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode." '490 Patent, 28:17-25. *See also* '737 Patent 26:65-27:6.

"Provided herein is a device comprising: at least one permanent magnet, a subunit coupled to the magnet, wherein the subunit enables movement of said at least one permanent magnet at a frequency between about 0.5 Hz and about 100 Hz, and logic that is operable to determine an intrinsic frequency (f) of a brain of a subject within a specified EEG band by: obtaining EEG data of the subject's brain; removing any DC component in the signal; performing a Fast Fourier Transformation the EEG data to determine a FFT curve X(f); and achieving a fitted Gaussian curve, A(f), of a local maximum of the FFT curve X(f) by: using the equation $A(f)=Ge^{(-(f-s)^2/2d^2)}$ (also depicted in FIG. 31), wherein G is gain, d is standard deviation, and s is the mean frequency based on the specified EEG band, and determining a goodness of fit measure by optimizing using the following equation

$$H(X, A) = \sum_{f=s-1\ Hz}^{s+1\ Hz} |X(f) - A(f)|$$

(also depicted in FIG. 32), by: estimating a first mean frequency, a first standard of deviation, and first gain for the first optimizing loop, shifting the gain, G, up or down slightly from the first

gain, determining a new gain resulting in a better fit than that of the first gain, shifting the standard of deviation, d, up or down slightly from the first standard of deviation, determining a new standard of deviation resulting in a better fit than that of the first standard of deviation, shifting the mean frequency, s, up or down slightly from the first mean frequency, determining a new mean frequency resulting in a better fit than that of the first mean frequency, and repeating steps 2), 3), and 4), in which the first gain, the first standard of deviation, and the first mean frequency are replaced with a second gain, a second standard of deviation, and a second mean frequency, respectively, until the three parameters are optimized." '490 Patent, 29:39-30:8. *See also* '737 Patent 28:21-57.

"In another aspect are methods of using a Transcranial Magnetic Stimulation (TMS) device for influencing an intrinsic frequency of a subject within a specified EEG band, comprising: (a) adjusting output of said TMS device; (b) changing EEG frequency, Q-factor, or coherence by repetitive firing of a magnetic field using said TMS device; and (c) applying said magnetic field close to a head of the subject;" '737 Patent 30:31-37.

"In another aspect are methods of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a healthy population database; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the healthy population database, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the healthy population database, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject." '490 Patent, 31:4-22. *See also* '737 Patent 24:4-21.

"Provided herein is a method comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject." '737 Patent 31:49-55.

Provided herein is a method comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a rear region of the brain of the subject. '737 Patent 31:66-32:5.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is

a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the dorsal and frontal regions of the cortex of the subject. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex." '490 Patent, 32:50-33:10.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject." '490 Patent, 33:10-18.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a rear region of the brain of the subject." '490 Patent, 33:29-36.

"The methods may further comprise: (a) locating a first electrode operable to detect electrical brain activity on the subject in at least one of an area of low electrical resistivity on a subject, and an area with substantially no electrical impulse interference on a subject; (b) locating a second electrode operable to detect a reference signal on the subject; and (c) determining the intrinsic frequency or the Q-factor or both from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode." '490 Patent, 33:64-34:5. *See also* '737 Patent 32:33-41.

"Likewise, a subject who has MDD may have an EEG waveform such as shown in FIG. 35 *c*, and treating such a subject with a device and or by a method provided herein may still provide the improvement in their depression noted herein by shifting their intrinsic frequency, changing their Q-factor, and/or changing their coherence, etc." '490 Patent, 35:49-60. *See also* '737 Patent 34:18-24.

"FIG. 36 *a*, and FIG. 36 *b* depict the frequency plots from FIG. 35 *b*, and FIG. 35 *d*, respectively, with a fitted Gaussian waveforms shown. FIG. 36 *a* shows the fitted Gaussian curve of the Fast Fourier Transformation curve having an intrinsic frequency of 8.56 Hz, and having a delta f (Δf) of 0.51 Hz. The Q-factor of the fitted Gaussian curve peak is in FIG. 36 *a* is 16.78." '490 Patent, 36:25-31. *See also* '737 Patent 34:61-67.

"FIG. 36 *b* shows the Fast Fourier Transformation curve of EEG data of an example EEG waveform for a subject who does not have Major Depressive Disorder, also depicted in FIG. 35 *d*, and shows the fitted Gaussian curve of the Fast Fourier Transformation curve having an intrinsic frequency of 9.27 Hz, and having a delta f (Δf) of 1.06 Hz. The Q-factor of the fitted Gaussian curve peak is in FIG. 36 *a* is 7.74." '490 Patent, 36:32-38. *See also* '737 Patent 35:1-8.

"In some embodiments, the method further comprises repeating the applying step after an interval about 6 hours to about 14 days. In some embodiments, the method further comprises: (a) locating a first electrode operable to detect electrical brain activity on the subject in at least one of an area of low electrical resistivity on a subject, and an area with substantially no electrical impulse interference on a subject; (b) locating a second electrode operable to detect a reference signal on the subject; and (c) determining the intrinsic frequency from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode." '490 Patent, 38:30-41.

"In some embodiments, methods and/or devices as described herein can be used to halt the onset of a seizure. In some embodiments, methods and/or devices as described herein can be used to prevent the onset of a seizure. In some embodiments, methods and/or devices as described herein can be used to reduce or eliminate seizures by detuning the brain near the frequency of the seizures. In some embodiments, methods and/or devices as described herein can be used to reduce or eliminate seizures by tuning up an area of the brain (i.e., an intrinsic frequency in a band, such as alpha) different than the seizure area of the brain, thereby reducing the energy in the frequency associated with the seizure." '490 Patent, 43:45-56. *See also* '737 Patent 38:35-46.

"In some embodiments, the intrinsic frequency of the subject is an alpha frequency of a brain of the subject. In some embodiments, alpha EEG of a brain of a subject can be critical in normal cognitive processes and the desynchronization of alpha activity can play a pathophysiological role in the mental disorders listed above." '490 Patent, 46:57-62. *See also* ' 737 Patent 41:48-53.

"A single or a plurality of electrodes may be placed on the scalp for coherence measurement, phase measurement, intrinsic frequency measurement, and/or Q-factor measurement. Noise from scalp movement and/or resistivity from the skull may be filtered from the signal (or signals) received from the EEG electrodes, however, such filtering may not be necessary. Curve smoothing may be applied to the signal (or signals) received from the EEG electrodes, however, such curve smoothing may not be necessary. Using any of the EEG recording means noted herein, multiple signal recordings may be taken and combined to determine, for non-limiting example, a coherence measurement, an intrinsic frequency measurement, and/or a Q-factor measurement. An EEG electrode cap may be used, and signals from one or more electrodes of the cap may be used as described herein to determine an intrinsic frequency, a Q-factor, or coherence." '490, 54:39-43. *See also* '737 Patent 51:26-42.

"The device as described herein may be operable to measure the EEG signal from the subject's brain prior to and/or after the application of the magnetic field to the subject. The device as described herein may comprise logic (in a computer readable format—for non-limiting example, hardware, software) that receives and records the EEG signal prior to and/or following

application of the magnetic field to the subject's brain (or a portion thereof). The device as described herein may comprise logic (in a computer readable format) that determines the intrinsic frequency of a specified EEG band of the subject using the EEG signal prior to and/or following application of the magnetic field to the subject's brain (or a portion thereof)." '490 Patent, 57:3-15. *See also* '737 Patent 51:6-67.

"Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. In some embodiments, influencing an intrinsic frequency may include influencing harmonics of the pre-selected intrinsic frequency of the specified EEG band. In some embodiments, the pre-selected intrinsic frequency is a harmonic of the peak intrinsic frequency of a specified EEG band. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency that can be represented in the frequency domain by an impulse function. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency having no variation (standard of deviation around the target frequency is 0). In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 1% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 5% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 10% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 10% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 15% of the target frequency. In some embodiments, influencing an intrinsic frequency may include providing a magnetic field having a target frequency plus or minus at most 20% of the target frequency." '490 Patent, 57:28-65. *See also* '737 Patent 52:18-55.

"Provided herein is a method of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising determining the intrinsic frequency of the subject within the specified EEG band; comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a healthy population database; if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the healthy population database, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the healthy population database, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method." '490 Patent, 58:16-35. *See also* '737 Patent 53:6-26.

"In some embodiments of at least one aspect described herein, the step of applying the magnetic field is for a pre-determined cumulative treatment time. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 0.5 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 1 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 50 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 30 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 20 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 10 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 3 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 1 Hz." '490 Patent, 60:4-28. *See also* '737 Patent 54:62-55:19.

"In some embodiments, of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is up to about 25 Hz. As used herein, the term "about" when referring to a frequency can mean variations of 0.1 Hz-0.2 Hz, 0.1 Hz to 0.5 Hz, 0.5 Hz to 1 Hz, or 1 Hz to 5 Hz." '490 Patent, 60:29-34. *See also* '737 Patent 55:20-25.

"In some embodiments, the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies in the specified EEG band. In some embodiments the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies across a plurality of EEG bands. In some embodiments the specified EEG band is the Alpha band. In some embodiments the specified EEG band is the Beta band." '490 Patent 60:35-42. *See also* '737 Patent 55:26-33.

"While an anatomical location of substantially no electrical impulse interference, and/or a location having substantially no muscle activity (but where brain activity may be measured) may provide a clearer EEG signal resulting in less noise and reduced resistivity from the skull, nevertheless, the methods provided herein may comprise placing the first electrode on the scalp (either directly, and/or with hair between the scalp and the electrode). The methods provided herein may comprise placing a plurality of electrodes on the scalp for coherence measurement, intrinsic frequency measurement, and/or Q-factor measurement. The methods provided herein may comprise filtering from the signal (or signals) received from the EEG electrodes noise from scalp movement and/or resistivity from the skull. The methods provided herein may comprise smoothing the signal curve received and/or determined from the EEG electrodes. The methods provided herein may comprise determining from multiple signal recordings: a coherence measurement, an intrinsic frequency measurement, and/or a Q-factor measurement using any of the EEG recording means noted herein. An EEG electrode cap may be used, and signals from one or more electrodes of the cap may be used as described herein to determine an intrinsic frequency, a Q-factor, or coherence." '490 Patent, 61:56-62:11. *See also* '737 Patent 56:47-57:2.

"Measuring the EEG signal from the subject's brain (i.e. measuring EEG data of the subject) may be done prior to and/or after the application of the magnetic field to the subject. The method may comprise receiving the EEG signals (i.e. receiving the reference signal from the reference electrode and receiving the brain activity from the first electrode) prior to application of the magnetic field to the subject's brain (or a portion thereof). The method may comprise recording the EEG signals prior to application of the magnetic field to the subject's brain (or a portion thereof). The EEG signals (i.e. receiving the reference signal from the reference electrode and receiving the brain activity from the first electrode) received and/or recorded prior to application of the magnetic field to the subject's brain (or a portion thereof) may be used in determining at least one of the intrinsic frequency of a specified EEG band of the subject, the Q-factor of an intrinsic frequency of a specified EEG band of the subject, the phase of the intrinsic frequencies of a specified EEG band of the subject, and the coherence of the intrinsic frequencies of a specified EEG band of the subject measured at multiple brain locations." '490 Patent, 62:32-52. *See also* '737 Patent 57:23-43.

"The EEG signals received and/or recorded (i.e. the reference signal from the reference electrode and the brain activity from the first electrode) following (or after) application of the magnetic field to the subject's brain (or a portion thereof) may be used in determining at least one of the post-treatment intrinsic frequency of a specified EEG band of the subject, the post-treatment Q-factor of an intrinsic frequency of a specified EEG band of the subject, the post-treatment phase of the intrinsic frequencies of a specified EEG band of the subject, and the post-treatment coherence of the intrinsic frequencies of a specified EEG band of the subject measured at multiple brain locations. Determining the intrinsic frequency may comprise removing the reference signal detected by the second electrode from the electrical brain activity detected by the first electrode. Determining the Q-factor of an intrinsic frequency of the specified EEG band comprises ascertaining the Q-factor from the electrical brain activity detected by the first electrode and the reference signal detected by the second electrode by removing the reference signal detected by the second electrode from the electrical brain activity detected by the first electrode and calculating the Q-factor from the intrinsic frequency fo and the Δf as shown in FIG. 12." '490 Patent, 62:60-63:15. *See also* '737 Patent 57:51-58:6.

"Provided herein is a method comprising adjusting an output of an electric alternating current source for influencing an intrinsic frequency of a EEG band of a subject toward a target frequency of the EEG band; and applying said electric alternating current across a head of the subject. In some embodiments of the methods, a CES therapy is used to influence the intrinsic frequency of a patient's brain toward a target frequency as measured by EEG." '490 Patent, 64:42-49. *See also* '737 Patent 59:36-43.

"Provided herein is a method comprising adjusting an output current of an electric alternating current source for influencing an intrinsic frequency of an EEG band of a subject toward a target frequency of the EEG band; and applying said output current across a head of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject. In some embodiments, the step of adjusting the output current comprises setting the output current to the target frequency. In some

embodiments, the method further comprises determining the intrinsic frequency of the EEG band of the subject; and comparing the intrinsic frequency to the target frequency of the EEG band, wherein the target frequency is an average intrinsic frequency of the EEG bands of a healthy population of people, wherein if the intrinsic frequency is higher than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is lower than the intrinsic frequency of the subject, and if the intrinsic frequency is lower than the target frequency, the step of adjusting the output current comprises setting the output current to a frequency that is higher than the intrinsic frequency of the subject." '490 Patent, 64:50-65:8. *See also* '737 Patent 59:44-67.

"In some embodiments of the methods, a controlled waveform CES therapy is used to influence a Q-factor of an intrinsic frequency of a patient's brain. FIG. 12 shows an example of the Q-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The Q-factor is defined as the ratio of $f_0/\Delta f$. As can be seen, when ΔF decreases for a given f_0, the Q-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases." '490 Patent, 65:14-26.

"In some embodiments, the EEG band is the alpha band measured by EEG. In some embodiments, the intrinsic frequency is the alpha frequency of the patient's brain measured by EEG." '490 Patent, 65:58-61. *See also* '737 Patent 60:51-53.

"EEG data during treatments are recorded and individualized according to the alpha EEG intrinsic frequency (8-13 Hz). The precision of the stimulus rate can be refined to the level of 10% of a hertz. It is determined on each patient's average alpha frequency, obtained from 3 central EEG leads (C3, C4, and Cz)." '490 Patent, 69:5-10.

"Raw EEG data are edited offline by an experienced technician who is blind to the treatment conditions to eliminate any significant (>3_arc) eye movements or any other type of apparent artifact. Ten to twenty-four artifact-free epochs (1,024 data points per epoch) in each recording channel are calculated by a fast Fourier transform (FFT) routine to produce a power spectrum with 0.2 Hz frequency resolution. The intrinsic frequency of alpha EEG is defined as the mean peak frequency (Fp) of 3 central leads (C3, C4, and Cz). EEG variables used in the analysis included power density (Pwr), peak frequency (Fp), Fp longitudinal coherence, and frequency selectivity (Q). See Jin Y et al. Alpha EEG predicts visual reaction time. *Int J. Neurosci.* 116: 1035-44 (2006), which is incorporated by reference in its entirety." '490 Patent, 69:51-64. *See also* '737 Patent 64:45-58.

"A NEST device was set at a fixed specified frequency equal to an intrinsic frequency within her alpha EEG band and the magnetic field emanating from the device was applied to the patient's head (cerebral cortex)." '490 Patent, 70:30-34. *See also* '737 Patent 65:23-26.

"The NEST device was used to tune an intrinsic frequency (of the patient's alpha wave). Following treatment, the patient reported a reduction of the symptoms of fibromyalgia." '490 Patent, 78:9-12. *See also* '737 Patent 72:66-73:2.

"All subjects underwent a traditional 19-lead EEG recording. A Cadwell Easy 2.1 EEG system was used to take the 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. The specific alpha frequency (pre-selected frequency) was selected from the EEG recording using a curve-fitting technique to determine the subject's intrinsic frequency of the alpha wave and to determine the Q-factor of the alpha wave." '490 Patent, 79:25-32. *See also* '737 Patent 74:14-21.

"When using the sham, the same procedure as the prototype was followed in that the subject's EEG was recorded and the sham cylinder rotation was set to the average alpha frequency (the subject's intrinsic frequency of his/her alpha wave)." '490 Patent, 79:41-45. *See also* '737 Patent 74:30-34.

"EEG readings were taken before treatment began. A Cadwell Easy 2.1 EEG system was used to take a 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading." '490 Patent, 83:33-36. *See also* '737 Patent 78:18-21.

"Various bodily functions operate at frequencies that are harmonics or sub-harmonics of the brain's intrinsic frequency." '111 Patent, 2:39-41.

"a. Delta band intrinsic frequency (<4 Hz). Delta waves are normally prevalent in infants, during slow wave sleep or during continuous attention tasks in adults." '111 Patent, 3:52-54.

"b. Theta band intrinsic frequency (4-8 Hz). Theta waves are commonly found in children and during periods of drowsiness in adults." '111 Patent, 3:59-61.

"c. Alpha band intrinsic frequency (8-13 Hz). Alpha band is normally found during periods of relaxation while closing the eyes." '111 Patent, 4:1-3.

"d. Beta band intrinsic frequency (13-30 Hz). Beta band is associated with alertness, busy or anxious thinking." '111 Patent, 4:13-14.

"e. Gamma band intrinsic frequency (˜40 Hz). Gamma activity displays during cross-modal sensory processing or short term memory matching of recognized objects, sounds, or tactile sensations." '111 Patent, 4:18-21.

"In a preferred embodiment of the present invention, an harmonic of a patient's heart rate is used to determine the rTMS frequency in a patient where the alpha brain wave frequency cannot be determined or which is poorly defined. An harmonic of the heart rate is chosen which most closely corresponds to a frequency within the alpha brain wave intrinsic frequency of 8-13 Hz. If the intrinsic alpha brain wave frequency of an autistic patient or an Alzheimer's patient cannot be determined or is ill-defined then an harmonic of the heart rate is chosen which is within the 8-13 Hz range. The patient is then treated with rTMS at that harmonic and the patient is monitored

with EEG to determine when an intrinsic alpha brain wave frequency emerges. Then the rTMS frequency can be changed to this frequency if it is different than the original harmonic used. For example, if an autistic patient has a heart rate of 1.5 Hz and the patient's intrinsic alpha brain waves cannot be determined then the rTMS treatments are initially set to the 6th harmonic or 9 Hz. The patient is treated at this frequency until an intrinsic alpha brain wave frequency is established. rTMS treatments are then continued at the intrinsic frequency." '111 Patent, 4:37-59.

"The following Table 1 shows examples of the present invention where rTMS is used to modify alpha brain waves (intrinsic frequency 8-13 Hz)." '111 Patent, 4:61-63.

"The following Table 2 shows examples of the present invention where rTMS is used to modify delta brain waves (intrinsic frequency <4 Hz)." '111 Patent, 5:12-14.

"The following Table 3 shows examples of the present invention where rTMS is used to modify theta brain waves (intrinsic frequency 4-8 Hz)." '111 Patent, 5:31-33.

"The following Table 4 shows examples of the present invention where rTMS is used to modify beta brain waves (intrinsic frequency 13-30 Hz)." '111 Patent, 5:51-53.

"The following Table 5 shows examples of the present invention where rTMS is used to modify gamma waves (intrinsic frequency ˜40 Hz)." '111 Patent, 6:9-11.

"The following Table 6 shows examples of the present invention where rTMS is used to modify Mu brain waves of the sensory motor cortex (intrinsic frequency 8-13 Hz)." '111 Patent, 6:29-31.

"In contrast, Katz targets a desired brain ***state,*** which encompasses **a range** of frequencies in multiple bands. Claim 1 of the present invention provides for adjusting a magnetic field output to a setting operable to influence an intrinsic **frequency** of a specified EEG band of the subject toward a target intrinsic **frequency,** not toward a state encompassing a range of frequencies. The Office Action tacitly acknowledges this difference by referring to the desired state of Katz and frequencies in each state, as opposed to a particular target frequency as is claimed." '408 Prosecution History at *737 (March 12, 2012 Amendment in Response to Office Action, p. 7).

"Further, Claim 1 of the present invention recites adjusting output of a magnetic field to influence the subject's intrinsic frequency in a specified EEG band toward a target intrinsic frequency of ***the same*** EEG band. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***" '408 Prosecution History at *737 (March 12, 2012 Amendment in Response to Office Action, p. 7).

"The Office Action points to Katz Column 6 lines 16-61 and states "Katz states that a higher magnitude magnetic field increases the focus of a mean frequency, which is the equivalent of modifying the bandwidth of an intrinsic frequency to a preselected bandwidth." On the contrary,

Katz's reference to focus refers to the focal area of the brain, and not a focus of a mean frequency. Katz actually says that "a key component [of the magnetic field] is field strength. Greater magnitude [of field strength] implies more influence on the intended [focal area of the brain], although the size of that [focal area] will also increase as the magnitude [of field strength] increases" in Column 6 lines 16-61. This makes sense, since Katz uses multiple magnets having unique and varying frequencies, magnitudes, positions and durations applied to the subject's head. Thus, Katz recognizes that field strength is one parameter (of several) that may be used in order to achieve its goal of moving a subject from a state in one EEG band to a state in another EEG band; however, Katz neither discloses nor suggests "adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency within a specified EEG band of the subject toward a pre-selected Q-factor."" '408 Prosecution History at *737-38 (March 12, 2012 Amendment in Response to Office Action, p. 7-8).

"The Examiner refers to a definition of "coherence" in the Office Action based on Katz. However, Applicants respectfully disagree with this characterization of the term based on the way the term is used in the claims and specification herein. Coherence, as used in the present application, refers to how closely matched are the intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band (*e.g.,* how closely matched is a first intrinsic frequency of a first site in the brain of the subject within a specified EEG band to a second intrinsic frequency of a second site in the brain of the subject within the same EEG band, at least). (See, e.g. para [0169], at least). It is expressed as a coherence value. Thus, if the two or more intrinsic frequencies are matched in frequency, a coherence value shows this matching characteristic. Likewise, if the two or more intrinsic frequencies are not matched, the coherence value expresses this. A coherence value that is higher (more coherent) would indicate that the intrinsic frequencies are more closely matched than the situation in which a coherence value is lower (indicating less coherent). Accordingly, the method is written such that the subject's own coherence value may shifted up or down-- toward a pre-selected coherence value." '408 Prosecution History at *738 (March 12, 2012 Amendment in Response to Office Action, p. 8).

"Katz fails to disclose or suggest this method, or a device adapted to achieve this. First, Katz fails to disclose or suggest providing a pre-selected coherence value. Second, Katz also fails to disclose or suggest determining a coherence value of the intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band. Third, Katz fails to disclose or suggest adjusting output of a magnetic field to a setting that is operable to .. .influence a coherence value of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value wherein if the coherence value is higher than the target coherence value, applying at least two asynchronous magnetic fields close to the head of the subject, and wherein if the coherence value is lower than the target coherence value, applying at least one synchronized magnetic field close to a head of the subject. Rather, Katz expresses a goal of achieving **symmetry in magnitude** of the EEG readings starting with asynchronous magnetic fields (0.5Hz, 5Hz). (See, Column 8 line 39-60, at least). Thus, any **secondary** preference toward coherent waves appears to use **asynchronous magnetic fields** to achieve coherent waves. (See, Column 8 line 39-60, at least). This is different with respect to how fields are used in Claim 1 to influence coherence toward the pre-selected coherence value." . '408 Prosecution History at *739 (March 12, 2012 Amendment in Response to Office Action, p. 9).

"Again, Katz targets a desired brain ***state,*** which encompasses **a range** of frequencies in multiple bands. Claim 2 of the present invention provides for applying a magnetic field output that adjusts an intrinsic **frequency** of a specified EEG band of the subject by applying one or more of: a single target frequency in the **same EEG band** as the intrinsic frequency, a plurality of frequencies within the **same EEG band** as the intrinsic frequency, and the intrinsic frequency of a brain of the subject within the **same EEG band** as the intrinsic frequency. As Katz attempts to move the subject outside of a measured state into another state, this is necessarily targeting ***moving the brain waves from one band to another.*** Thus, there is no disclosure or suggestion in Katz of a particular specific method that would achieve this which uses the same method as described and enabled in the present claim." '408 Prosecution History at *740 (March 12, 2012 Amendment in Response to Office Action, p. 10).

"As noted above, Katz moves a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), Katz' methods and devices move the brain waves from one band to another. This fails to disclose or suggest a device configured to influence a subject's intrinsic frequency within **a specified EEG band."** '408 Prosecution History at *741-42 (March 12, 2012 Amendment in Response to Office Action, p. 11-12).

"Applicants, Applicant's representative, and Examiners discussed and clarified the terms of intrinsic frequency, Q-factor and coherence. No agreement was reached regarding claim 1. Prior art and double patenting issues with family related cases were discussed and terminal disclaimers or arguments will be submitted at a later time." '408 Prosecution History at *748 (May 21, 2012 Applicant Initiated Interview Summary).

"Further, Claim 2 of the present invention recites adjusting output of a magnetic field and influencing the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***" '408 Prosecution History at *800 (September 10, 2012 Amendment in Response to Final Office Action, p. 8).

"Alternatively, or additionally, Claim 2 targets a Q factor of an intrinsic frequency within a single EEG band (the "specified EEG band"). As described and shown in the instant specification (for example at paragraphs [0300], [0326] and in Figure 12, at least), a Q-factor is a measure of the distribution around the frequency within a single EEG band. Changing a frequency from one band to another band does not inherently or necessarily change the Q-factor, which is essentially a distribution around a particular frequency. In contrast, Katz makes no effort or disclosure regarding the Q-factor or other distribution of frequencies around an intrinsic frequency." '408 Prosecution History at *800 (September 10, 2012 Amendment in Response to Final Office Action, p. 8).

"Examiners and Applicant's counsel discussed language in claim 2 regarding differences in moving vs influencing intrinsic frequencies and Q - factors. Potential issues regarding language in claims 12 and 22 were pointed out bv the Examiners. Examiners will get back to Applicant's counsel in regards to how to claim the programmed method in the apparatus claims." '408 Prosecution History at *819 (January 3, 2013 Applicant Initiated Interview Summary).

"With respect to Claim 2, Katz fails to teach or suggest "moving at least one of: an intrinsic frequency of a brain of the subject within a specified EEG band toward a pre-selected intrinsic frequency within the same specified EEG band and a Q-factor of the intrinsic frequency." In contrast, Katz targets a desired brain ***state,*** which encompasses **a range** of frequencies in multiple bands. Claim 2 of the present invention targets a pre-selected intrinsic **frequency,** not a state encompassing a range of frequencies. The Office Action tacitly acknowledges this difference by referring to the desired state of Katz and frequencies in each state, as opposed to a particular pre-selected frequency as is claimed." '408 Prosecution History at *1746 (January 18, 2013 Amendment in Response to Final Office Action, p. 8).

"Further, Claim 2 of the present invention recites moving the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***" '408 Prosecution History at *1746 (January 18, 2013 Amendment in Response to Final Office Action, p. 8).

"Alternatively, or additionally, Claim 2 moves a Q factor of an intrinsic frequency. As described and shown in the instant specification (for example at paragraphs [0300], [0326] and in Figure 12, at least), a Q-factor is a measure of the distribution around the frequency within a single EEG band. Changing a frequency from one band to another band does not inherently or necessarily change the Q-factor, which is essentially a distribution around a particular frequency. In contrast, Katz makes no effort or disclosure regarding the Q-factor or other distribution of frequencies around an intrinsic frequency." '408 Prosecution History at *1746-47 (January 18, 2013 Amendment in Response to Final Office Action, p. 8-9).

"The Examiner suggested "amending the claim to positively recite the item that moves the intrinsic frequency of the EEG band **OR** Q-factor so that it reads -- ... moving, using the magnetic field, ... --". Without conceding the appropriateness of such rejection and in order to advance prosecution, Applicants have made the suggested amendments to claims 1 and 2 and respectfully request that this rejection be withdrawn and the pending claims be advanced to allowance." '737 Prosecution History at *1551 (June 10, 2014, Response to Final Office Action, p. 5).

"Claims 1 and 2 are unclear because it is not apparent what is doing the moving of the intrinsic frequency of the EEG band or Q-factor. Examiner suggests amending the claim to positively recite the item that moves the intrinsic frequency of the EEG band **OR** Q-factor so that it reads- ... moving, using the magnetic field…." '737 Prosecution History at *1507 (March 25, 2014, Final Office Action, p. 4).

“In regards to claims 1 and 2, the prior art of record does not teach or suggest a method as claimed by Applicant, that includes the step of moving at least one of an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band and a O-factor of an intrinsic frequency within a specified EEG band of the subject toward a pre-selected O-factor using said magnetic field.” ’737 Prosecution History at *1508 (March 25, 2014, Final Office Action, p. 5).

“With respect to Claims 1 and 2, as amended, Katz fails to teach or suggest **moving** "an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band" and with respect to Claim 1, Katz further fails to teach or suggest **moving** "a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a preselected Q-factor." Additionally, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject" or that "the preselected Q-factor is a Q-factor that increases blood flow in the cortex of the subject" as required in Claim 1. Similarly, with respect to Claim 2, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject."” ’737 Prosecution History at *1308 (February 13, 2014, Amendment in Response to Non-Final Office Action, p. 6).

“Further, Claim 1 of the present invention recites adjusting output of a magnetic field and moving the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band, wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***” ’737 Prosecution History at *1308 (February 13, 2014, Amendment in Response to Non-Final Office Action, p. 6).

“The Office Action states "Katz discloses a method that influences EEG frequencies in the brain by applying a magnetic field close to the head of a subject. Katz states that the invention disclosed executes steps to influence intrinsic frequencies of EEG bands to a desired state via magnetic stimulation" (column 6, lines 16-61). This action makes the adjustments to a magnetic field based on a subject's intrinsic frequency and would require the determination of the subject's intrinsic frequency in a specified EEG band." On the contrary, Katz's actually says that the system compares the characteristics of the actual brain state to those of the desired brain state. The characteristics of the brain state are the temporal and spatial distributions of the ***various frequency bands of the brain signal, e.g., the mean frequency corresponding to various magnitudes of alpha, beta, delta, and theta rhythms.*** The therapeutic goal determines the gap between the measured and desired brain state, how the system adjusts key parameters of the magnetic stimulation in order to reduce the gap between the actual and desired state, and what constitutes an acceptable brain state. ***For example, an acceptable brain state may be achieved by obtaining lower frequency states,*** between 1.5 and 7.5 HZ, to induce and/or maintain sleep, producing alpha frequency brain waves (between 8 and 13 HZ) to achieve calm or relaxation,

etc. In sum, Katz is concerned with moving the current brain state to another brain state (in Column 6 lines 16-61). In contrast, Claims 1 and 2 of the present invention, and claims dependent therefrom, require moving the intrinsic frequency in a single EEG band, or moving the **Q** factor of an intrinsic frequency in a single EEG band (Claim 1)." '737 Prosecution History at *1308-09 (February 13, 2014, Amendment in Response to Non-Final Office Action, p. 6-7).

"In regards to claims 1 and 4, Katz discloses a method that influences EEG frequencies in the brain by applying a magnetic field close to the head of a subject. Katz states that the invention disclosed executes steps to influence intrinsic frequencies of EEG bands to a desired state via magnetic stimulation (column 6, lines 16-61). This action makes the adjustments to a magnetic field based on a subject's intrinsic frequency and would require the determination of the subject's intrinsic frequency in a specified EEG band. Katz discloses the algorithm that is executed by a computational system that adjusts parameters of magnetic stimulation until the distance between the desired EEG signal and an actual EEG signal is minimized (column 7, lines 26-63). Katz also shows in figure 2 a system with magnets that apply the magnetic field to the head of the subject (column 6, line 62 - column 7, line 18). In addition, influencing something doesn't necessarily mean that an effect is actually produced which allows Katz to meet the limitations of the claim. Furthermore, the limitations "for influencing at least one of ... Q-factor" and "wherein the pre-selected intrinsic frequency .... subject" are expressions of an intended result and is not given weight (See MPEP 2111.04)." '737 Prosecution History at *1278 (September 13, 2013, Non-Final Office Action, p. 5).

"Katz targets a desired brain ***state,*** which encompasses ***a range*** of frequencies in multiple EEG bands. Claim 12 of the present invention requires a device that is configured to move1 an intrinsic frequency, not a state encompassing a range of frequencies. Further, movement of the intrinsic frequency of Claim 12 is within a ***single*** specified EEG band in a preselected direction, up or down, and thus movement of the intrinsic frequency is only within that single specified EEG band and only in a pre-selected direction, up or down (support in Paragraph [459]). In contrast, Katz' methods and devices move the subject's brain waves from one band to another, by teaching moving the subject from one brain state to a desired brain state. Brain states in Katz correlate to separate EEG bands in Katz (e.g. from relaxed in the alpha band to sleep in the delta or theta band)." '490 Prosecution History at *1753-54 (July 7, 2014, Response to Final Office Action, p. 6-7). *See also* '490 Prosecution History at *1754 (June 9, 2014, Response to Final Office Action, p. 7);'490 Prosecution History at *1530 (March 19, 2014, Response to Office Action, p. 8).

"Further, Katz fails to disclose or suggest a system comprising a magnetic field generator adapted to apply a magnetic field to a head of a subject, wherein the magnetic field generator comprises information comprising a **Q** factor of an intrinsic frequency of a brain of the subject and a processor that controls the magnetic field and wherein the magnetic field is configured to move the Q-factor in a pre-selected direction, up or down, within a specified EEG band using said magnetic field as required in Claim 12.2 As provided in the present application Figure 12, at least, and descriptions thereof, Q-factor is a measure of distribution around the intrinsic frequency within a single EEG band. Katz has no measurement or recognition of any such distribution around an intrinsic frequency, as it seeks to move brain states, without regard for any intrinsic frequency in a particular EEG band.)." '490 Prosecution History at *1804 (July 7,

2014, Response to Final Office Action, p. 7). *See also* '490 Prosecution History at *1754 (June 9, 2014, Response to Final Office Action, p. 7).

"Continuation of 11 does NOT place the application in condition for allowance because: The amendment raises new 112 issues, specifically missing essential elements in regards to claims 12-22. Claim 12 recites a magnetic field configured to perform several tasks. It is unclear how the magnetic field generator can create a magnetic field that performs these tasks without certain components like the EEG sensors (which would be required to identify what the current intrinsic frequency is in an EEG band) and the logic/circuitry that allows the magnetic field to be configured in such a manner to accomplish the listed tasks.

Applicant argues that Katz does not meet the limitations specified in the claim, specifically that Katz does not teach moving an intrinsic frequency of a brain of a subject within a specified EEG band, specifically moving the EEG band from one frequency in a single EEG band to another frequency of the same EEG band and also does not show that or moves a Q factor the intrinsic frequency. While this may be the case, the claim as written does not specify that limitation. The claim states that the magnetic field moves the an intrinsic frequency within a specified EEG band which would happen when you through different EEG bands to reach a specific one.

In addition, US 6,488,617 would also currently read on claims 12, 19, 20, and 21.

Examiner suggests amending the claim to include the missing elements and amending parts (a) and (b) of claim 12 to the following: --(a) move the intrinsic frequency toward a pre-selected intrinsic frequency within the specified EEG band using said magnetic field—and --(b) c) move a Q-factor of the intrinsic frequency within a specified EEG band of the subject toward a pre-selected Q-factor of the intrinsic frequency using the magnetic field. '490 Prosecution History at *1781 (June 19, 2014, Advisory Action Before Filing of an Appeal Brief, p. 2).

"Finally, in order to provide further distinction to the claimed invention, new dependent claims 14-17 have been added to recite that the rTMS frequency is equal to, or a harmonic or sub-harmonic of, a non-EEG biological metric having a highest coherence coefficient to an intrinsic frequency in a desired EEG band." '111 Prosecution History at *68 (December 27, 2017, Amendment under 37 CFR §1.114, p. 6).

XI. Move an/the [intrinsic frequency…Q-Factor…] / Moving, using the magnetic field,….[an intrinsic frequency, …QFactor…] (Claim Number 20)

In another aspect are methods of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than

the intrinsic frequency of the subject. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, amblyopia or Parkinson's disease).

'408 Patent 1:46-67. *See also* '408 Patent 17:39-55 (similar); '737 Patent 6:4-22 (similar); '737 Patent 23:7-24; '737 Patent 24:4-21; '490 Patent 6:8-25 (similar); '490 Patent 31:4-22.

Disclosed herein, in certain embodiments, are methods of treating PTSD by altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject. Disclosed herein, in certain embodiments, are methods of treating PTSD by modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor (i.e., a measure of frequency selectivity of a specified EEG band) of the subject toward a target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject. In some embodiments, the Q-factor is adjusted (or tuned) up. In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: determining the Q-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the Q-factor of the intrinsic frequency from step (a) to an average Q-factor of the intrinsic frequency of a control group; if the Q-factor of the intrinsic frequency from step (a) is higher than the average Q-factor of the intrinsic frequency of the control group, tuning down the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a plurality of frequencies or with a single target frequency close to a head of the subject; and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the intrinsic frequency of the control group, tuning up the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a target frequency to a head of the subject.

'408 Patent 19:27-67. *See also* '408 Patent 21:16-60 (similar disclosure for treatment of coma); '408 Patent 24:12-61 (similar disclosure for treatment of Parkinson's Disease).

Provided herein is a method of altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising determining the intrinsic frequency of the subject within the specified EEG band; comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group,

shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method.

'408 Patent 40:64-41:15; '490 Patent 58:16-35 (similar); '737 Patent 53:6-26.

Provided herein is a method of altering a Q-factor of an intrinsic frequency within a specified EEG band of a subject, comprising determining the Q-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the Q-factor of the intrinsic frequency from step (a) to an average Q-factor of the intrinsic frequency of a control group; if the Q-factor of the intrinsic frequency from step (a) is higher than the average Q-factor of the intrinsic frequency of the control group, tuning down the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with varying frequencies close to a head of the subject; and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the intrinsic frequency of the control group, tuning up the Q-factor of the intrinsic frequency of the subject by applying a specific magnetic field with a target frequency close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method.

'408 Patent 41:16-34. *See also* '737 Patent 53:27-46 (similar); '490 Patent 58:36-55 (similar).

Katz fails to anticipate the elements of Claims 1 and 2, at least. Katz describes *a* ***feedback system,*** which ***in real time,*** tries to move a subject ***from a current brain state into a desired brain state*** via magnetic stimulation. Brain states targeted in Katz are categorized based on the level of alertness of the subject. (Col. 1, line 14 to 34). These states include sleep states associated with brain wave frequencies in the delta and theta ranges of 1.5 to 3 .5 Hz and 3 .5 to 7 Hz, respectively, a relaxed state associated with brain wave frequencies in the alpha range of 7.5 to 12.5 Hz, and an excited state associated with brain wave frequencies in the beta range of 12.5 to 20 Hz *(Id., See also,* Col. 6, lines 16-35). Thus, each state of Katz is within a different EEG band, and Katz tries to move the subject from one state (in one band) to another state (in another band). At least the following distinctions can be made from the present claims.

With respect to Claim 1, Katz fails to teach or suggest "adjusting output of a magnetic field to a setting that is operable to ... influence an intrinsic frequency of a specified EEG band of the subject toward a target intrinsic frequency of the specified EEG band."

In contrast, Katz targets a desired brain ***state,*** which encompasses **a range** of frequencies in multiple bands. Claim 1 of the present invention provides for adjusting a magnetic field output to a setting operable to influence an intrinsic **frequency** of a specified EEG band of the subject toward a target intrinsic **frequency,** not toward a state encompassing a range of frequencies. The Office Action tacitly acknowledges this difference by referring to the desired state of Katz and frequencies in each state, as opposed to a particular target frequency as is claimed.

Further, Claim 1 of the present invention recites adjusting output of a magnetic field to influence the subject's intrinsic frequency in a specified EEG band toward a target intrinsic frequency of

the same EEG band. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***

Also with respect to Claim 1, since Katz is concerned with moving the current brain state to another brain state, Katz fails to teach or suggest "adjusting output of a magnetic field to a setting that is operable to ... influence a Q-factor of the intrinsic frequency toward a target Q-factor." As described and shown in the instant specification (for example at paragraphs [0313], and in Figure 12, at least), a Q-factor is a measure of the distribution around the frequency within a single EEG band.

The Office Action points to Katz Column 6 lines 16-61 and states "Katz states that a higher magnitude magnetic field increases the focus of a mean frequency, which is the equivalent of modifying the bandwidth of an intrinsic frequency to a preselected bandwidth." On the contrary, Katz's reference to focus refers to the focal area of the brain, and not a focus of a mean frequency.
Katz actually says that "a key component [of the magnetic field] is field strength. Greater magnitude [of field strength] implies more influence on the intended [focal area of the brain], although the size of that [focal area] will also increase as the magnitude [of field strength] increases" in Column 6 lines 16-61. This makes sense, since Katz uses multiple magnets having unique and varying frequencies, magnitudes, positions and durations applied to the subject's head. Thus, Katz recognizes that field strength is one parameter (of several) that may be used in order to achieve its goal of moving a subject from a state in one EEG band to a state in another EEG band; however, Katz neither discloses nor suggests "adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency within a specified EEG band of the subject toward a pre-selected Q-factor."

'408 Prosecution History at *736-738. *See also* '737 Prosecution History at *1307-1309; '490 Prosecution History at *1529-30.

As noted above, Katz moves a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), Katz' methods and devices move the brain waves from one band to another. This fails to disclose or suggest a device configured to influence a subject's intrinsic frequency within **a specified EEG band.**

Further, Katz fails to disclose or suggest a device that is configured to influence a Qfactor. The sections of Katz referred to in the Office Action misconstrue the word "focus" to mean a distribution around a frequency. On the contrary, Katz uses the term "focus" to refer to the "focal area of the brain." This is supported by Katz and technically justified based on Katz itself, at least, since when an increased magnitude of field strength is applied to a location on the brain of a subject, the focal area of the field brain likewise increases (i.e., the field reaches farther, wider into the brain of the subject). Thus, Katz fails to provide or suggest a device configured to influence a Q-factor. '408 Prosecution History at *741-42.

1. (Currently Amended) A method of treating Parkinson's disease, treating coma, treating post traumatic stress disorder (PTSD), treating amblyopia, and/or enhancing cognitive performance, in a subject, comprising:
(a) adjusting output of a magnetic field to a setting that is operable to do one or more of the following:
- influence move an intrinsic frequency of a specified EEG band of the subject toward a target intrinsic frequency of the specified EEG band,
- influence move a Q-factor of the intrinsic frequency toward a target Q-factor,
- influence move a coherence value of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value wherein if the coherence value is higher than the target coherence value, applying at least two asynchronous magnetic fields close to the head of the subject, and wherein if the coherence value is lower than the target coherence value, applying at least one synchronized magnetic field close to a head of the subject; and
- influence move an EEG phase between two sites in the brain of a subject of a specified EEG frequency toward a target EEG phase of the specified EEG frequency wherein the magnetic field comprises one or more magnetic field generators that are of the same frequency and are in-phase with each other, of the same frequency and out of phase with each other, or a combination thereof; and

(a) applying said magnetic field close to a head of the subject. ’408 Prosecution History at *1740.

12. (Currently Amended) A device for use in treating Parkinson's disease, treating coma, treating post traumatic stress disorder (PTSD), treating amblyopia, and/or enhancing cognitive performance in a subject, comprising: a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field comprises
a first processor that controls the application of the magnetic field and
the first processor or a second processor that moves is configured to influence at least one of:
(a) an intrinsic frequency of a brain of the subject within a specified EEG band;
(b) a Q-factor of an intrinsic frequency of the brain of the subject within a specified EEG band;
(c) a coherence value of intrinsic frequencies among multiple sites in the brain of the subject within a specified EEG band wherein if the coherence value is higher than a pre-selected coherence value, applying at least two asynchronous magnetic fields close to the head of the subject, and wherein if the coherence value is lower than the pre-selected coherence value, applying at least one synchronized magnetic field close to a head of the subject; and
(d) a EEG phase between two sites in the brain of the subject of a specified EEG frequency wherein the magnetic field comprises a first magnetic field that is in-phase with a second magnetic field or a first magnetic field that is out of phase with a second magnetic field. ’408 Prosecution History at *1742.

“The Examiner suggested "amending the claim to positively recite the item that moves the intrinsic frequency of the EEG band **OR** Q-factor so that it reads -- ... moving, using the magnetic field, ... --". Without conceding the appropriateness of such rejection and in order to advance prosecution, Applicants have made the suggested amendments to claims 1 and 2 and

respectfully request that this rejection be withdrawn and the pending claims be advanced to allowance." '737 Prosecution History at *1551.

(Currently Amended) A method comprising:
(a) adjusting output of a magnetic field;
(b) applying said magnetic field close to a head of a subject; and
(c) moving, using the magnetic field, at least one of
an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band and
a Q-factor of an intrinsic frequency within a specified EEG band of the subject
toward a pre-selected Q-factor,
wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject.
2. (Currently Amended) A method comprising:
(a) adjusting output of a magnetic field;
(b) applying said magnetic field close to a head of a subject; and
(c) moving, using the magnetic field, an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band,
wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject. '737 Prosecution History at *1548.

12. (Currently Amended) A system for treating depression in a subject comprising: a means magnetic field generator for applying adapted to apply a magnetic field to a head of the subject; whereby wherein the means for applying the magnetic field is capable of influencing at least one of: (a) moves an intrinsic frequency of a brain of the subject within a specified EEG band; (b) moves a Q-factor of the an intrinsic frequency of-the brain of the subject 1tvithin a specified EEG band; (c) moves a coherence value of intrinsic frequencies among multiple sites in the brain of the subject within a specified EEG band by applying the magnetic field and a second magnetic field that is asynchronous with the magnetic field close to a head of the subject and reducing the coherence value, or by applying the magnetic field and the second magnetic field that is synchronized with the magnetic field close to the head of the subject and raising the coherence value; and or (d) moves a EEG phase between two sites in the brain of the subject of a the specified EEG frequency, and wherein the magnetic field increases the blood flow of cortex of the brain or decreases the blood flow of a lower region of the brain and a device capable of determining the blood flow of at least one of the cortex and a lower region of the brain. '490 Prosecution History at *1525-26.

XII. One synchronized magnetic field (Claim Number 25)

In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value; and (b) applying said magnetic field close to a head of the subject In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value comprising: determining the coherence

value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a control group; if the coherence value from step (a) is higher than the average coherence value of the control group, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the control group, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, the control group is a set of subjects having a particular trait, characteristic, ability, or feature. In some embodiments, the control group is a control group set of subjects not having a neurological disorder disclosed herein (e.g., Post Traumatic Stress Disorder, coma, amblyopia, or Parkinson's disease).

'408 Patent 2:28-54. *See also* 18:18-39 (similar).

Disclosed herein, in certain embodiments, are methods of treating PTSD by modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value; and (b) applying said magnetic field close to a head of the subject Disclosed herein, in certain embodiments, are methods of treating PTSD by adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a control group; if the coherence value from step (a) is higher than the average coherence value of the control group, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the control group, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject.

'408 Patent 20:1-23. *See* '408 Patent 24:62-25:11 (similar disclosure for the treatment of Parkinson's Disease).

Disclosed herein, in certain embodiments, are methods of treating a coma by modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value; and (b) applying said magnetic field close to a head of the subject. In certain instances, there is high coherence between different regions of the brain. In certain instances, in a coma, the subject has almost no neural activity (e.g., poor coherence). In certain instances, in a coma, the subject has a nearly sinusoidal EEG waveform (e.g., very high coherence). In some embodiments, the coherence of a subject is adjusted such that it falls between poor coherence and high coherence. Disclosed herein, in certain embodiments, are methods of treating a coma by adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value comprising: lowering the coherence value of the subject by applying at least two asynchronous magnetic

fields close to a head of the subject. Disclosed herein, in certain embodiments, are methods of treating a coma by adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value comprising raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject.

’408 Patent 21:61-22:22.

Disclosed herein, in certain embodiments, are methods of improving cognitive performance by modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value; and (b) applying said magnetic field close to a head of the subject. In some embodiments, the subject's coherence is adjusted closer to the subject's natural coherence. In some embodiments, the subject's coherence is increased when a coherent magnetic field is applied across the brain. In some embodiments, improving coherence allows for better communication between regions in the brain. In some embodiments, improving coherence improves performance, both athletically and academically. Disclosed herein, in certain embodiments, are methods of improving cognitive performance by adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a control group; if the coherence value from step (a) is higher than the average coherence value of the control group, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the control group, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject.

’408 Patent 26:49-27:20.

Provided herein is a method of improving coherence of intrinsic frequencies within a specified EEG band among multiple locations of a brain of a subject, comprising determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a control group; if the coherence value from step (a) is higher than the average coherence value of the control group, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the control group, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method.

’408 Patent 41:35-51.

In particular embodiments, two bar magnets can be used, each mounted at the end of a shaft. The shafts can be rotated by adjustable motors. The magnets can be positioned on opposite sides of the subject's head, and they are rotated synchronously to provide a more uniform phase for the magnetic field in the brain. When the north Pole of one bar magnet is next to the subject's scalp, the south Pole of the other magnet will be next to the subject's scalp on the opposite side of the subject's head.

’408 Patent 49:27-35.

Katz fails to disclose or suggest this method, or a device adapted to achieve this. First, Katz fails to disclose or suggest providing a pre-selected coherence value. Second, Katz also fails to disclose or suggest determining a coherence value of the intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band. Third, Katz fails to disclose or suggest adjusting output of a magnetic field to a setting that is operable to .. .influence a coherence value of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value wherein if the coherence value is higher than the target coherence value, applying at least two asynchronous magnetic fields close to the head of the subject, and wherein if the coherence value is lower than the target coherence value, applying at least one synchronized magnetic field close to a head of the subject. Rather, Katz expresses a goal of achieving **symmetry in magnitude** of the EEG readings starting with asynchronous magnetic fields (0.5Hz, 5Hz). (See, Column 8 line 39-60, at least). Thus, any **secondary** preference toward coherent waves appears to use **asynchronous magnetic fields** to achieve coherent waves. (See, Column 8 line 39-60, at least). This is different with respect to how fields are used in Claim 1 to influence coherence toward the pre-selected coherence value.

Further, other examples in Katz (e.g. Column 8 lines 60- Column 9 line 16), again refer to the use of the methods and devices of Katz using synchronization "causing the mind to move [from a relaxed state] to a state of alert readiness." In Katz, this is achieved with "a larger magnet set," however, it is undisclosed in Katz how synchronization is achieved, i.e., what field distribution would achieve this. (Id.) In fact, Katz is a feedback system that adjusts based on a subject's reaction to a particular field, and Katz indicates this "will vary from patient to patient." Thus, Katz again fails to disclose the method of Claim 1, which describes a particular method and field arrangement to use based on the subject's coherence value and the target coherence value, neither of which Katz discloses or suggests.

’408 Prosecution History at *739.

Likewise, Katz fails to provide or suggest a device configured influence a subject's coherence value to lower or raise the coherence value as claimed, since Katz expresses a goal of achieving **symmetry in magnitude** of the EEG readings starting with asynchronous magnetic fields (0.5Hz, 5Hz). Thus, any **secondary** preference toward coherent waves appears to also use **asynchronous magnetic fields.** (See, Column 8 line 39-60, at least). This is different with respect to how fields are configured in Claim 12 to influence the subject's coherence value toward the pre-selected coherence value.

’408 Prosecution History at *742.

XIII. Out of phase (Claim Number 16)

"In some embodiments, the magnetic field results from a first magnetic source and a second magnetic source. In some embodiments, the first magnetic source and the second magnetic source are out of phase relative to each other. In some embodiments, the amount that the first magnetic source and the second magnetic source are out of phase relative to each other is called the magnetic phase." '408 Patent, 4:34-40. *See also*'408 Patent 13:26-31'490 Patent 3:49-52; '490 Patent, 8:11-18; '490 Patent, 17:9-15.

"The magnetic fields (first magnetic field, and second magnetic field) may be of the same frequency, but out of phase with each other. Additional magnetic fields may be provided by additional means for applying such magnetic fields. These too may be out of phase with each other, or with any of the magnetic fields. Nevertheless, the magnetic fields in some embodiments may have the same frequencies." '408 Patent, 14:11-17. *See also* '490 Patent, 17:49-55.

"FIG. 29 shows the magnetic field strengths of two magnets moving at the same frequency at the same time, but having a magnetic phase relative to one another (out of phase relative to each other)." '408 Patent, 16:48-51. *See also* '490 Patent, 23:20-23.

"FIG. 30 shows a theoretical EEG electrode readings measured at two locations on a subject's head within a single EEG band when the two locations are exhibiting similar (or the same) frequency, but are out of phase relative to each other, i.e. displaying an EEG phase." '408 Patent, 16:51-55. *See also* '490 Patent, 23:24-28.

"FIG. 29 shows the magnetic field strengths **2997** *a*, **2997** *b* of two magnets moving at the same frequency at the same time **2992**, but having a magnetic phase **2991** relative to one another (out of phase relative to each other). The magnetic field strengths in this graph are plotted with time on the x axis, and magnetic field strength on the y axis (with two x axis, to show the relative field strengths of each magnet simultaneously). As depicted in FIG. 29, a first magnetic source and a second magnetic source may be out of phase relative to each other in order to influence the EEG phase of the subject. In some embodiments, the amount that the first magnetic source and the second magnetic source are out of phase relative to each other is called the magnetic phase **2991**. The magnetic phase may be measured peak to peak (i.e. peak of the first magnet's field strength to peak of the second magnet's field strength—as shown in FIG. 29, at **2991**), or trough to trough, or inflection to inflection, or any similar plot characteristic on both of the magnets' field strength graphs." '408 Patent, 36:5-23.

"FIG. 30 shows theoretical EEG electrode readings **3095** *a*, **3095** *b* measured at two locations on a subject's head within a single EEG band when the two locations are exhibiting similar (or the same) frequency, but are out of phase relative to each other, i.e. displaying an EEG phase **3089**. The EEG readings over time in this graph are plotted with time on the x axis, and EEG readings on the y axis (with two x axis, to show two EEG electrode readings taken simultaneously at different locations on the head of the subject). As depicted in FIG. 30, a first EEG reading **3095** *a*, and a second EEG reading **3095** *b* may be out of phase relative to each other. In some embodiments, the amount that the first EEG reading and the second EEG reading are out of phase relative to each other is called the EEG phase **3089**. The EEG phase **3089** may be

measured peak to peak (i.e. peak of the first EEG reading to peak of the second EEG reading—as shown in FIG. 30, at **3089**), or trough to trough, or inflection to inflection, or any similar plot characteristic on both of the EEG reading graphs." '408 Patent, 37:25-44.

"Provided herein is a device comprising, a means for applying a first magnetic field to a head of a subject; and a means for applying a second magnetic field to a head of a subject whereby the means for applying the first magnetic field and the means for applying the second magnetic field are capable of influencing an EEG phase between at least two sites in a brain of the subject of a specified EEG frequency. The magnetic fields (first magnetic field, and second magnetic field) may be of the same frequency, but out of phase with each other." '408 Patent, 37:53-62. *See also* '490 Patent, 55:6-15.

"Additional magnetic fields may be provided by additional means for applying such magnetic fields. These too may be out of phase with each other, or with any of the magnetic fields. Nevertheless, the magnetic fields in some embodiments may have the same frequencies. The devices may be a Permanent Magneto-EEG Resonant Therapy (pMERT) (i.e. a Neuro-EEG Synchronization Therapy NEST device) as described herein." 408 Patent, 37:63-38:3. *See also* '490 Patent, 55:16-23.

"Provided herein is a method of improving coherence of intrinsic frequencies within a specified EEG band among multiple locations of a brain of a subject, comprising determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a control group; if the coherence value from step (a) is higher than the average coherence value of the control group, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the control group, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method." '408 Patent, 41:35-51.

"In some embodiments, the magnetic field results from a first magnetic source and a second magnetic source. In some embodiments, the first magnetic source and the second magnetic source are out of phase relative to each other. In some embodiments, the amount that the first magnetic source and the second magnetic source are out of phase relative to each other is called the magnetic phase." '408 Patent, 42:41-47. *See also* '490 Patent, 28:45-48; '490 Patent, 59:64-60:3.

"In some embodiments, a magnetic field results from a first magnetic source and a second magnetic source. FIG. 29 shows the magnetic field strengths **2997** *a*, **2997** *b* of two magnets moving at the same frequency at the same time **2992**, but having a magnetic phase **2991** relative to one another (out of phase relative to each other). The magnetic field strengths in this graph are plotted with time on the x axis, and magnetic field strength on the y axis (with two x axis, to show the relative field strengths of each magnet simultaneously). As depicted in FIG. **29**, a first magnetic source and a second magnetic source may be out of phase relative to each other in order to influence the EEG phase of the subject. In some embodiments, the amount that the first

magnetic source and the second magnetic source are out of phase relative to each other is called the magnetic phase **2991**. The magnetic phase may be measured peak to peak (i.e. peak of the first magnet's field strength to peak of the second magnet's field strength—as shown in FIG. 29, at **2991**), or trough to trough, or inflection to inflection, or any similar plot characteristic on both of the magnets' field strength graphs." '490 Patent, 53:26-45.

"The magnetic phase of the device may be operable to influence an EEG phase between a first site and a second site in the brain of a subject of a specified EEG frequency. FIG. 30 shows theoretical EEG electrode readings **3095** *a*, **3095** *b* measured at two locations on a subject's head within a single EEG band when the two locations are exhibiting similar (or the same) frequency, but are out of phase relative to each other, i.e. displaying an EEG phase **3089**. The EEG readings over time in this graph are plotted with time on the x axis, and EEG readings on the y axis (with two x axis, to show two EEG electrode readings taken simultaneously at different locations on the head of the subject). As depicted in FIG. 30, a first EEG reading **3095** *a*, and a second EEG reading **3095** *b* may be out of phase relative to each other. In some embodiments, the amount that the first EEG reading and the second EEG reading are out of phase relative to each other is called the EEG phase **3089**. The EEG phase **3089** may be measured peak to peak (i.e. peak of the first EEG reading to peak of the second EEG reading—as shown in FIG. 30, at **3089**), or trough to trough, or inflection to inflection, or any similar plot characteristic on both of the EEG reading graphs." '490 Patent, 54:44-64.

"Furthermore, Katz fails to provide or suggest a device configured to influence an EEG phase between two sites in the brain of the subject of a specified EEG frequency wherein the magnetic field comprises a first magnetic field that is in-phase with a second magnetic field or a first magnetic field that is out of phase with a second magnetic field for similar reasons as noted above, at least." '408 Prosecution History at *742 (March 12, 2012 Amendment in Response to Office Action, p. 12).

XIV. Pre-selected (Claim Number 17)

"In one aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected or target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject." '490 Patent, 1:41-46. *See also* '737 Patent 1:39-44 (similar).

"In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a pre-selected or target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject." '490 Patent, 6:26-31. *See also* '737 Patent 6:23-29.

"In another aspect are methods of treating a subject, comprising: determining the Q-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the Q-factor of the intrinsic frequency from step (a) to an average Q-factor of the intrinsic frequency of a healthy population database; if the Q-factor of the intrinsic frequency from step (a) is higher than the average Q-factor of the intrinsic frequency of the healthy population database, tuning down the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a plurality of

frequencies or with a single pre-selected frequency close to a head of the subject; and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the intrinsic frequency of the healthy population database, tuning up the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a pre-selected frequency to a head of the subject." '737 Patent 6:30-45. *See also* '490 Patent 6:32-47.

"In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value; and (b) applying said magnetic field close to a head of the subject." '490 Patent, 6:48-53. *See also* '737 Patent 6:46-51.

"In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject." '490 Patent, 6:54-7:3. *See also* '737 Patent 6:52-67.

"In another aspect are methods for treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject of a specified EEG frequency toward a pre-selected EEG phase of the specified EEG frequency; and (b) applying said magnetic field close to a head of the subject." '490 Patent, 7:30-35. *See also* '737 Patent 7:26-31.

"In some embodiments of at least one aspect described above, the step of applying the magnetic field is for a pre-determined cumulative treatment time. In some embodiments of at least one aspect described herein, the pre-selected or target intrinsic frequency with the specified EEG band is from about 0.5 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 1 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 50 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 30 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 20 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 10 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 3 Hz. In some embodiments of at least one aspect described above, the pre-selected or

target intrinsic frequency with the specified EEG band is greater than about 1 Hz. In some embodiments, of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is up to about 25 Hz." '490 Patent, 8:21-52. *See also* '737 Patent 8:15-46.

"In some embodiments, the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies in the specified EEG band. In some embodiments the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies across a plurality of EEG bands. In some embodiments the specified EEG band is the Alpha band. In some embodiments the specified EEG band is the Beta band." '490 Patent, 8:53-60. *See also* '737 Patent 8:47-54.

"In some embodiments of at least one aspect described above, the pre-selected or target frequency is an average intrinsic frequency of a healthy population database within a specified EEG band. In some embodiments of at least one aspect described above, the pre-selected or target frequency is an intrinsic frequency of a brain of the subject within a specified EEG band." '490 Patent, 9:18-24. *See also* '737 Patent 9:13-19.

"In some embodiments, influencing an intrinsic frequency may include influencing harmonics of the pre-selected intrinsic frequency of the specified EEG band. In some embodiments, the pre-selected intrinsic frequency is a harmonic of the peak intrinsic frequency of a specified EEG band. In some embodiments, influencing the pre-selected intrinsic frequency includes applying harmonic frequencies of the pre-selected intrinsic frequency. In some embodiments, the varying frequencies comprise harmonic frequencies of a single frequency. The single frequency may comprise the pre-selected intrinsic frequency." '490 Patent, 15:38-48. *See also* '737 Patent 15:33-43.

"The specified EEG frequency may be an intrinsic frequency as described herein. The specified EEG frequency may be a pre-selected frequency as described herein. The pre-selected frequency may be an average intrinsic frequency of a healthy population database within a specified EEG band." '490 Patent, 17:3-8. *See also* '737 Patent 16:65-17:3; '490 Patent 17:59-63; '737 Patent 17:53-58; '490 Patent, 54:40-43. '737 Patent 49:29-32.

"Provided herein is a method of treating depression in a subject, comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex." '490 Patent, 18:5-12. *See also* '490 Patent, 37:37-44; '490 Patent 39:20-28 (similar).

"Provided herein is a method of treating depression in a subject, comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency within a specified EEG band of the subject toward a pre-selected Q-factor; and applying said magnetic field close to a head of the subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex." '490 Patent, 18:13-20. *See also* '490 Patent 37:45-52; '490 Patent 39:29-37 (similar).

"Provided herein is a method of treating depression in a subject, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected coherence value; and (b) applying said magnetic field close to a head of the subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex." '490 Patent, 18:21-29. *See also* '490 Patent 37:53-61; '490 Patent 39:38-47 (similar).

"Provided herein is a method for treating depression in a subject, comprising: adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject of a specified EEG frequency toward a pre-selected EEG phase of the specified EEG frequency; and applying said magnetic field close to a head of the subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex." '490 Patent, 18:30-37. *See also* '490 Patent, 37:62-38:2; '490 Patent 39:48-56 (similar).

"Provided herein is a method comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the Subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject." '737 Patent 18:1-12.

"Provided herein is a method to treat depression comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject." '490 Patent, 19: 55-65.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject." '490 Patent, 19:66-20:6.

Provided herein is a method comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject. '737 Patent 18:13-19.

"In one aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-

selected or target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject." '490 Patent, 24:53-58. *See also* '737 Patent 23:1-6.

"In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a pre-selected or target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject." '490 Patent, 31:23-28. *See also* '737 Patent 29:53-58; '737 Patent 42:39-44 (similar).

"In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value; and (b) applying said magnetic field close to a head of the subject." '490 Patent, 31:45-50. *See also* '737 Patent 30:8-13.

"In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject." '490 Patent, 31:51-67. *See also* '737 Patent 30:14-30.

"In another aspect are methods for treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject of a specified EEG frequency toward a pre-selected EEG phase of the specified EEG frequency; and (b) applying said magnetic field close to a head of the subject." '490 Patent, 32:8-13. *See also* '737 Patent 30:38-43.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject. Provided herein is a method for treating depression comprising:

adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the dorsal and frontal regions of the cortex of the subject. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex." '490 Patent, 32:50-33:10. *See also* '737 Patent 31:22-48.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected Q-factor; and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that decreases blood flow in a parietal-occipital region of the brain of the subject. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulated gyrus, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia." '490 Patent, 33:11-28. *See also* '737 Patent 31:49-65.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a rear region of the brain of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected Q-factor; and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that decreases blood flow in a parietal-occipital region of the brain of the subject. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia." '490 Patent, 33:29-46. *See also* '737 Patent 31:66-32:15.

"In some embodiments, the pre-selected EEG phase is lower than the EEG phase between the two sites in the brain of the subject. In some embodiments, the pre-selected EEG phase is any EEG phase lower than the EEG phase between the two sites in the brain of the subject. In some embodiments, the pre-selected EEG phase is higher than the EEG phase between the two sites in the brain of the subject. In some embodiments, the pre-selected EEG phase is any EEG phase higher than the EEG phase between the two sites in the brain of the subject. In some embodiments, the pre-selected EEG phase is an EEG phase of a population of people. The population of people may be a set of people having a particular trait, characteristic, ability, or feature. The population may be a healthy population of people. The population of people may be a set of people not having a particular disorder, such as anxiety, depression, or other disorders mentioned herein. In some embodiments, the methods comprise measuring EEG data of two sites in the brain of the subject, and calculating the EEG phase between the two sites in the brain of a subject. The specified EEG frequency may be an intrinsic frequency as described herein. The

specified EEG frequency may be a pre-selected frequency as described herein. The pre-selected frequency may be an average intrinsic frequency of a healthy population database within a specified EEG band." '490 Patent, 41:18-41. *See also* '737 Patent 36:8-31.

"In some embodiments, a method of treating a subject comprises: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a pre-selected or target Q-factor of the band; and (c) applying said magnetic field close to a head of the subject." '490 Patent, 47:49-54. *See also* '737 Patent 42:39-44.

"In some embodiments, the first site in the brain of a subject may generally align with a first permanent magnet, and the second site in the brain of a subject may generally align with a second permanent magnet of the device to influence the EEG phase between those two sites. Additional sites also be measured, and additional magnets may additionally be used to influence the EEG phase between given sites toward a pre-selected EEG phase." '490 Patent, 54:65-55:5. *See also* '737 Patent 49:55-62.

"Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. In some embodiments, influencing an intrinsic frequency may include influencing harmonics of the pre-selected intrinsic frequency of the specified EEG band. In some embodiments, the pre-selected intrinsic frequency is a harmonic of the peak intrinsic frequency of a specified EEG band." '490 Patent, 57:28-40. *See also* '737 Patent 52:18-30.

"Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing a Q-factor a measure of frequency selectivity of a specified EEG band of the subject toward a pre-selected Q-factor of the band; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method." '490 Patent, 57:66-58:6. *See also* '737 Patent 52:56-63.

"Provided herein is a method comprising adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject of a specified EEG frequency toward a pre-selected EEG phase of the specified EEG frequency; and applying said magnetic field close to a head of the subject." '490 Patent, 59:12-17. *See also* '737 Patent 54:3-8.

"In some embodiments, the pre-selected EEG phase is lower than the EEG phase between the two sites in the brain of the subject. In some embodiments, the pre-selected EEG phase is any EEG phase lower than the EEG phase between the two sites in the brain of the subject. In some embodiments, the pre-selected EEG phase is higher than the EEG phase between the two sites in the brain of the subject. In some embodiments, the pre-selected EEG phase is any EEG phase higher than the EEG phase between the two sites in the brain of the subject. In some

embodiments, the pre-selected EEG phase is an EEG phase of a population of people." '490 Patent, 59:18-28. *See also* '737 Patent 54:9-19.

"In some embodiments, there is no pre-selected EEG phase. Rather, the method comprises adjusting output of a magnetic field for influencing an EEG phase between two sites in the brain of a subject within a specified EEG band; and applying said magnetic field close to a head of the subject. The EEG phase may be influenced to be lower, or higher." '490 Patent, 59:37-42. *See also* '737 Patent 54:28-33.

"The specified EEG frequency may be an intrinsic frequency as described herein. The specified EEG frequency may be a pre-selected frequency as described herein. The pre-selected frequency may be an average intrinsic frequency of a healthy population database within a specified EEG band." '490 Patent, 59:51-56. *See also* '737 Patent 54:42-47.

"In some embodiments of at least one aspect described herein, the step of applying the magnetic field is for a pre-determined cumulative treatment time. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 0.5 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 1 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 50 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 30 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 20 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 10 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 3 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 1 Hz. In some embodiments, of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is up to about 25 Hz. As used herein, the term "about" when referring to a frequency can mean variations of 0.1 Hz-0.2 Hz, 0.1 Hz to 0.5 Hz, 0.5 Hz to 1 Hz, or 1 Hz to 5 Hz." '490 Patent, 60:4-34. *See also* '737 Patent 54:62-55:25.

"In some embodiments, the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies in the specified EEG band. In some embodiments the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies across a plurality of EEG bands. In some embodiments the specified EEG band is the Alpha band. In some embodiments the specified EEG band is the Beta band." '490 Patent, 60:35-42. *See also* '737 Patent 55:26-33.

"All subjects underwent a traditional 19-lead EEG recording. A Cadwell Easy 2.1 EEG system was used to take the 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. The specific alpha frequency (pre-selected frequency) was selected from the EEG recording using a curve-fitting technique to determine the

subject's intrinsic frequency of the alpha wave and to determine the Q-factor of the alpha wave." '490 Patent, 79:25-32. *See also* '737 Patent 74:14-21.

"The first set of four bars represent the HAMD-17 weekly change in the SHAM group, the second set of four bars represent the HAMD-17 weekly change in the test group (NEST) of subjects having a fixed pre-selected frequency emitted from the device (the fixed pre-selected frequency being, in this example, the subject's own average intrinsic frequency), and the third set of four bars represent the HAMD-17 weekly change in the test group (NEST) of subjects having a random frequencies (hopping frequencies) emitted from the device within the alpha band (8-13 Hz), independent of the subject's own average intrinsic frequency." '490 Patent, 81:9-20. *See also* '737 Patent 75:65-76:9.

"Katz fails to disclose or suggest this method, or a device adapted to achieve this. First, Katz fails to disclose or suggest providing a pre-selected coherence value. Second, Katz also fails to disclose or suggest determining a coherence value of the intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band. Third, Katz fails to disclose or suggest adjusting output of a magnetic field to a setting that is operable to .. .influence a coherence value of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value wherein if the coherence value is higher than the target coherence value, applying at least two asynchronous magnetic fields close to the head of the subject, and wherein if the coherence value is lower than the target coherence value, applying at least one synchronized magnetic field close to a head of the subject. Rather, Katz expresses a goal of achieving **symmetry in magnitude** of the EEG readings starting with asynchronous magnetic fields (0.5Hz, 5Hz). (See, Column 8 line 39-60, at least). Thus, any **secondary** preference toward coherent waves appears to use **asynchronous magnetic fields** to achieve coherent waves. (See, Column 8 line 39-60, at least). This is different with respect to how fields are used in Claim 1 to influence coherence toward the pre-selected coherence value." '408 Prosecution History at *739 (March 12, 2012 Amendment in Response to Office Action, p. 9).

"In contrast, Katz targets a desired brain ***state,*** which encompasses **a range** of frequencies in multiple bands. Claim 2 of the present invention targets a pre-selected intrinsic **frequency,** not a state encompassing a range of frequencies. The Office Action tacitly acknowledges this difference by referring to the desired state of Katz and frequencies in each state, as opposed to a particular pre-selected frequency as is claimed." '408 Prosecution History at *800 (September 10, 2012 Amendment in Response to Final Office Action, p. 8).

"In regards to claims 1 and 2, the prior art of record does not teach or suggest a method as claimed by Applicant, that includes the step of moving at least one of an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band and a O-factor of an intrinsic frequency within a specified EEG band of the subject toward a pre-selected O-factor using said magnetic field." '737 Prosecution History at *1508 (March 25, 2014, Final Office Action, p. 5).

"With respect to Claims 1 and 2, as amended, Katz fails to teach or suggest **moving** "an

intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band" and with respect to Claim 1, Katz further fails to teach or suggest **moving** "a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a preselected Q-factor." Additionally, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject" or that "the preselected Q-factor is a Q-factor that increases blood flow in the cortex of the subject" as required in Claim 1. Similarly, with respect to Claim 2, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject"

In contrast, Katz targets a desired brain ***state,*** which encompasses **a range** of frequencies in multiple bands. Claim 1 of the present invention targets a pre-selected intrinsic **frequency,** not a state encompassing a range of frequencies. The Office Action tacitly acknowledges this difference by referring to the desired state of Katz and frequencies in each state, as opposed to a particular pre-selected frequency as is claimed.

Further, Claim 1 of the present invention recites adjusting output of a magnetic field and moving the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band, wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***" '737 Prosecution History at *1308 (February 13, 2014, Amendment in Response to Non-Final Office Action, p. 6).

"In regards to claims 1 and 4, Katz discloses a method that influences EEG frequencies in the brain by applying a magnetic field close to the head of a subject. Katz states that the invention disclosed executes steps to influence intrinsic frequencies of EEG bands to a desired state via magnetic stimulation (column 6, lines 16-61). This action makes the adjustments to a magnetic field based on a subject's intrinsic frequency and would require the determination of the subject's intrinsic frequency in a specified EEG band. Katz discloses the algorithm that is executed by a computational system that adjusts parameters of magnetic stimulation until the distance between the desired EEG signal and an actual EEG signal is minimized (column 7, lines 26-63). Katz also shows in figure 2 a system with magnets that apply the magnetic field to the head of the subject (column 6, line 62 - column 7, line 18). In addition, influencing something doesn't necessarily mean that an effect is actually produced which allows Katz to meet the limitations of the claim. Furthermore, the limitations "for influencing at least one of ... Q-factor" and "wherein the pre-selected intrinsic frequency .... subject" are expressions of an intended result and is not given weight (See MPEP 2111.04)." '737 Prosecution History at *1278 (September 13, 2013, Non-Final Office Action, p. 5).

"Katz targets a desired brain ***state,*** which encompasses ***a range*** of frequencies in multiple EEG bands. Claim 12 of the present invention requires a device that is configured to move1 an intrinsic frequency, not a state encompassing a range of frequencies. Further,

movement of the intrinsic frequency of Claim 12 is within a ***single*** specified EEG band in a preselected direction, up or down, and thus movement of the intrinsic frequency is only within that single specified EEG band and only in a pre-selected direction, up or down (support in Paragraph [459]). In contrast, Katz' methods and devices move the subject's brain waves from one band to another, by teaching moving the subject from one brain state to a desired brain state. Brain states in Katz correlate to separate EEG bands in Katz (e.g. from relaxed in the alpha band to sleep in the delta or theta band)." '490 Prosecution History at *1803-04 (July 7, 2014, Response to Final Office Action, p. 6-7). *See also* '490 Prosecution History at *1754 (June 9, 2014, Response to Final Office Action, p. 7);'490 Prosecution History at *1530 (March 19, 2014, Response to Office Action, p. 8) (similar).

XV. Pre-selected intrinsic frequency/Q-Factor/coherence value (Claim Number 13)

"In one aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected or target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject." '737 Patent 1:39-44 (similar).

"In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a pre-selected or target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject." '737 Patent 6:23-29.

"In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value; and (b) applying said magnetic field close to a head of the subject" '737 Patent 6:46-51.

"In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject." '737 Patent 6:52-67.

"In some embodiments of at least one aspect described above, the step of applying the magnetic field is for a pre-determined cumulative treatment time. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 0.5 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 1 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than

about 50 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 30 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 20 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 10 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 3 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 1 Hz. In some embodiments, of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is up to about 25 Hz. As used herein, the term "about" when referring to a frequency can mean variations of 0.1 Hz to 0.2 Hz, 0.1 Hz to 0.5 Hz, 0.5 Hz to 1 Hz, or 1 Hz to 5 Hz." '737 Patent 8:15-46.

"In some embodiments, the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies in the specified EEG band. In some embodiments the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies across a plurality of EEG bands. In some embodiments the specified EEG band is the Alpha band. In some embodiments the specified EEG band is the Beta band." '737 Patent 8:47-54.

"In some embodiments, influencing an intrinsic frequency may include influencing harmonics of the pre-selected intrinsic frequency of the specified EEG band. In some embodiments, the pre-selected intrinsic frequency is a harmonic of the peak intrinsic frequency of a specified EEG band. In some embodiments, influencing the pre-selected intrinsic frequency includes applying harmonic frequencies of the pre-selected intrinsic frequency. In some embodiments, the varying frequencies comprise harmonic frequencies of a single frequency. The single frequency may comprise the pre-selected intrinsic frequency." '737 Patent 15:33-43.

"Provided herein is a method comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the Subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject." '737 Patent 18:1-12.

Provided herein is a method comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject. '737 Patent 18:13-19.

"In one aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected or target intrinsic frequency of the specified EEG band; and (b) applying said magnetic field close to a head of the subject." '737 Patent 23:1-6.

"In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a pre-selected or target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject." '737 Patent 29:53-58. *See also* '737 Patent 42:39-44 (similar).

"In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value; and (b) applying said magnetic field close to a head of the subject." '737 Patent 30:8-13.

"In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject." '737 Patent 30:14-30.

"Provided herein is a method comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. Provided herein is a method comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject. Provided herein is a method comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected Q-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the dorsal and frontal regions of the cortex of the subject. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex." '737 Patent 31:22-48.

"Provided herein is a method comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower

region of the brain of the subject. Provided herein is a method comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected Q-factor; and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that decreases blood flow in a parietal-occipital region of the brain of the subject. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate gyms, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia." '737 Patent 31:49-65.

"Provided herein is a method comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a rear region of the brain of the subject. Provided herein is a method comprising: adjusting output of a magnetic field for influencing a Q-factor of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected Q-factor; and applying said magnetic field close to a head of the subject; wherein the pre-selected Q-factor is a Q-factor that decreases blood flow in a parietal-occipital region of the brain of the subject. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia." '737 Patent 31:66-32:15.

"Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. In some embodiments, influencing an intrinsic frequency may include influencing harmonics of the pre-selected intrinsic frequency of the specified EEG band. In some embodiments, the pre-selected intrinsic frequency is a harmonic of the peak intrinsic frequency of a specified EEG band." '737 Patent 52:18-30.

"Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing a Q-factor a measure of frequency selectivity of a specified EEG band of the subject toward a pre-selected Q-factor of the band; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method." '737 Patent 52:56-63.

"Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected coherence value; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method." '737 Patent 52:64-53:5.

"In some embodiments of at least one aspect described herein, the step of applying the magnetic field is for a pre-determined cumulative treatment time. In some embodiments of at least one

aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 0.5 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is from about 1 Hz to about 100 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 50 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 30 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 20 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is not greater than about 10 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 3 Hz. In some embodiments of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is greater than about 1 Hz.

In some embodiments, of at least one aspect described above, the pre-selected or target intrinsic frequency with the specified EEG band is up to about 25 Hz. As used herein, the term "about" when referring to a frequency can mean variations of 0.1 Hz-0.2 Hz, 0.1 Hz to 0.5 Hz, 0.5 Hz to 1 Hz, or 1 Hz to 5 Hz." '737 Patent 54:62-55:25.

"In some embodiments, the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies in the specified EEG band. In some embodiments the pre-selected and/or target intrinsic frequency is chosen from a plurality of intrinsic frequencies across a plurality of EEG bands. In some embodiments the specified EEG band is the Alpha band. In some embodiments the specified EEG band is the Beta band." '737 Patent 55:26-33.

"All subjects underwent a traditional 19-lead EEG recording. A Cadwell Easy 2.1 EEG system was used to take the 19-lead EEG reading. The intrinsic frequency in the alpha band (7-11 Hz) was determined using the initial EEG reading. The specific alpha frequency (pre-selected frequency) was selected from the EEG recording using a curve-fitting technique to determine the subject's intrinsic frequency of the alpha wave and to determine the Q-factor of the alpha wave." '737 Patent 74:14-21.

"Katz fails to disclose or suggest this method, or a device adapted to achieve this. First, Katz fails to disclose or suggest providing a pre-selected coherence value. Second, Katz also fails to disclose or suggest determining a coherence value of the intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band. Third, Katz fails to disclose or suggest adjusting output of a magnetic field to a setting that is operable to .. .influence a coherence value of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a target coherence value wherein if the coherence value is higher than the target coherence value, applying at least two asynchronous magnetic fields close to the head of the subject, and wherein if the coherence value is lower than the target coherence value, applying at least one synchronized magnetic field close to a head of the subject. Rather, Katz expresses a goal of achieving **symmetry in magnitude** of the EEG readings starting with asynchronous magnetic fields (0.5Hz, 5Hz). (See, Column 8 line 39-60, at least). Thus, any **secondary** preference toward coherent waves appears to use **asynchronous magnetic fields** to

achieve coherent waves. (See, Column 8 line 39-60, at least). This is different with respect to how fields are used in Claim 1 to influence coherence toward the pre-selected coherence value." '408 Prosecution History at *739 (March 12, 2012 Amendment in Response to Office Action, p. 9).

"Likewise, Katz fails to provide or suggest a device configured influence a subject's coherence value to lower or raise the coherence value as claimed, since Katz expresses a goal of achieving **symmetry in magnitude** of the EEG readings starting with asynchronous magnetic fields (0.5Hz, 5Hz). Thus, any **secondary** preference toward coherent waves appears to also use **asynchronous magnetic fields.** (See, Column 8 line 39-60, at least). This is different with respect to how fields are configured in Claim 12 to influence the subject's coherence value toward the pre-selected coherence value." '408 Prosecution History at *742 (March 12, 2012 Amendment in Response to Office Action, p. 12).

"In contrast, Katz targets a desired brain ***state,*** which encompasses **a range** of frequencies in multiple bands. Claim 2 of the present invention targets a pre-selected intrinsic **frequency,** not a state encompassing a range of frequencies. The Office Action tacitly acknowledges this difference by referring to the desired state of Katz and frequencies in each state, as opposed to a particular pre-selected frequency as is claimed." '408 Prosecution History at *800 (September 10, 2012 Amendment in Response to Final Office Action, p. 8).

"Further, Claim 2 of the present invention recites adjusting output of a magnetic field and influencing the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***" '408 Prosecution History at *800 (September 10, 2012 Amendment in Response to Final Office Action, p. 8).

"With respect to Claim 2, Katz fails to teach or suggest "moving at least one of: an intrinsic frequency of a brain of the subject within a specified EEG band toward a pre-selected intrinsic frequency within the same specified EEG band and a Q-factor of the intrinsic frequency." In contrast, Katz targets a desired brain ***state,*** which encompasses **a range** of frequencies in multiple bands. Claim 2 of the present invention targets a pre-selected intrinsic **frequency,** not a state encompassing a range of frequencies. The Office Action tacitly acknowledges this difference by referring to the desired state of Katz and frequencies in each state, as opposed to a particular pre-selected frequency as is claimed." '408 Prosecution History at *1746 (January 18, 2013 Amendment in Response to Final Office Action, p. 8).

"Further, Claim 2 of the present invention recites moving the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another."*** '408 Prosecution History at *1746 (January 18,

2013 Amendment in Response to Final Office Action, p. 8).

"In regards to claims 1 and 2, the prior art of record does not teach or suggest a method as claimed by Applicant, that includes the step of moving at least one of an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band and a O-factor of an intrinsic frequency within a specified EEG band of the subject toward a pre-selected O-factor using said magnetic field." '737 Prosecution History at *1508 (March 25, 2014, Final Office Action, p. 5).

"With respect to Claims 1 and 2, as amended, Katz fails to teach or suggest **moving** "an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band" and with respect to Claim 1, Katz further fails to teach or suggest **moving** "a Q-factor of an intrinsic frequency within a specified EEG band of a subject toward a preselected Q-factor." Additionally, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject" or that "the preselected Q-factor is a Q-factor that increases blood flow in the cortex of the subject" as required in Claim 1. Similarly, with respect to Claim 2, Katz fails to disclose or suggest that "the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject"

In contrast, Katz targets a desired brain ***state,*** which encompasses **a range** of frequencies in multiple bands. Claim 1 of the present invention targets a pre-selected intrinsic **frequency,** not a state encompassing a range of frequencies. The Office Action tacitly acknowledges this difference by referring to the desired state of Katz and frequencies in each state, as opposed to a particular pre-selected frequency as is claimed.

Further, Claim 1 of the present invention recites adjusting output of a magnetic field and moving the subject's intrinsic frequency in a specified EEG band toward a pre-selected intrinsic frequency of ***the same*** EEG band, wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected Q-factor is a Q-factor that increases blood flow in the cortex of the subject. On the other hand, Katz's only intention and goal is to move a subject ***from a current brain state into a desired brain state.*** Since the brain states correlate to separate EEG bands in Katz (i.e. from relaxed in the alpha band to sleep in the delta or theta band), ***Katz' methods and devices move the brain waves from one band to another.***" '737 Prosecution History at *1308 (February 13, 2014, Amendment in Response to Non-Final Office Action, p. 6).

"In regards to claims 1 and 4, Katz discloses a method that influences EEG frequencies in the brain by applying a magnetic field close to the head of a subject. Katz states that the invention disclosed executes steps to influence intrinsic frequencies of EEG bands to a desired state via magnetic stimulation (column 6, lines 16-61). This action makes the adjustments to a magnetic field based on a subject's intrinsic frequency and would require the determination of the subject's intrinsic frequency in a specified EEG band. Katz discloses the algorithm that is executed by a computational system that adjusts parameters of magnetic stimulation until the distance between the desired EEG signal and an actual EEG signal is minimized (column 7, lines 26-63). Katz also shows in figure 2 a system with magnets that apply the magnetic field to

the head of the subject (column 6, line 62 - column 7, line 18). In addition, influencing something doesn't necessarily mean that an effect is actually produced which allows Katz to meet the limitations of the claim. Furthermore, the limitations "for influencing at least one of ... Q-factor" and "wherein the pre-selected intrinsic frequency .... subject" are expressions of an intended result and is not given weight (See MPEP 2111.04)." '737 Prosecution History at *1278 (September 13, 2013, Non-Final Office Action, p. 5).

XVI. Q-Factor (Claim Number 18)

In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject. '408 Patent 2:1-6.

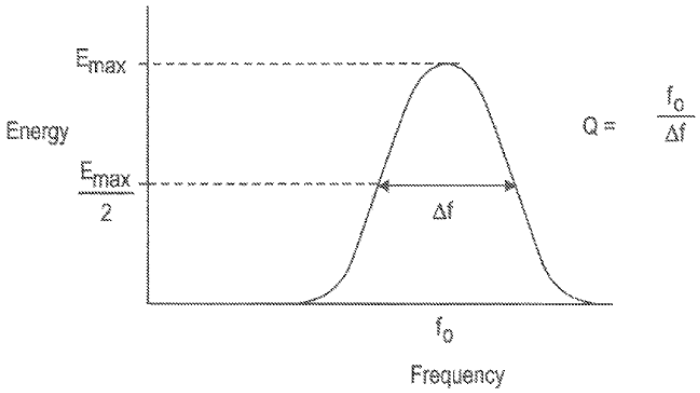

FIG. 12

FIG. 12 shows an example of the O-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The O-factor is defined as the ratio of $f_0/\Delta f$. As can be seen, when ΔF decreases for a given f_0, the O-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases. '408 Patent 15:49-59. *See also* '490 Patent 22:19-29; '737 Patent 20:30-41.

In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a O-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a target O-factor of the band; and (b) applying said magnetic field close to a head of the subject. In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: determining the O-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the O-factor of the intrinsic frequency from step (a) to an average O-factor of the intrinsic frequency of a control group; if the O-factor of the intrinsic frequency from step (a) is higher than the average O-factor of the intrinsic frequency of the control group, tuning down the O-factor of the intrinsic frequency of the subject by applying a magnetic field with a plurality of frequencies or with a single target frequency close to a head of the subject; and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the

intrinsic frequency of the control group, tuning up the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a target frequency to a head of the subject. '408 Patent 17:62-18:17.

Disclosed herein, in certain embodiments, are methods of treating PTSD by altering an intrinsic frequency of a brain of a subject within a specified EEG band, comprising: (a) determining the intrinsic frequency of the subject within the specified EEG band; (b) comparing the intrinsic frequency from step (a) to an average intrinsic frequency of a control group; (c) if the intrinsic frequency from step (a) is higher than the average intrinsic frequency of the control group, shifting down the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency lower than the intrinsic frequency of the subject; and (d) if the intrinsic frequency from step (a) is lower than the average intrinsic frequency of the control group, shifting up the intrinsic frequency of the subject by applying a specific magnetic field close to a head of the subject, wherein said specific magnetic field has a frequency higher than the intrinsic frequency of the subject. Disclosed herein, in certain embodiments, are methods of treating PTSD by modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor (i.e., a measure of frequency selectivity of a specified EEG band) of the subject toward a target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject. In some embodiments, the Q-factor is adjusted (or tuned) up. In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: determining the Q-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the Q-factor of the intrinsic frequency from step (a) to an average Q-factor of the intrinsic frequency of a control group; if the Q-factor of the intrinsic frequency from step (a) is higher than the average Q-factor of the intrinsic frequency of the control group, tuning down the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a plurality of frequencies or with a single target frequency close to a head of the subject; and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the intrinsic frequency of the control group, tuning up the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a target frequency to a head of the subject. '408 Patent 19:27-67. *See* '408 Patent 21:16-60 (similar statement for treatment of coma); '408 Patent 24:12-61 (similar statement for treatment of Parkinson's Disease).

Disclosed herein, in certain embodiments, are methods of improving cognitive performance by modulating the electrical activity of a brain in a subject in need thereof, comprising: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a target Q-factor of the band; and (b) applying said magnetic field close to a head of the subject. In some embodiments, the subject's Q-factor is adjusted to its natural level. In another aspect are methods of modulating the electrical activity of a brain in a subject in need thereof, comprising: determining the Q-factor of the intrinsic frequency within the specified EEG band of the subject; comparing the Q-factor of the intrinsic frequency from step (a) to an average Q-factor of the intrinsic frequency of a control group; if the Q-factor of the intrinsic frequency from step (a) is higher than the average Q-factor of the intrinsic frequency of the control group, tuning down the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a plurality of frequencies or with a single target frequency close to a head of the subject; and if the Q-factor of the intrinsic frequency from step (a) is lower than the average Q-factor of the intrinsic frequency of the control group, tuning up the Q-factor of the intrinsic frequency of the subject by applying a magnetic field with a target frequency to a head of the subject. '408 Patent 26:24-48.

In some embodiments, a method of modulating the electrical activity of a brain in a subject in need thereof comprises: (a) adjusting output of a magnetic field for influencing a Q-factor, a measure of frequency selectivity of a specified EEG band, of the subject toward a target Q-factor of the band; and (c) applying said magnetic field close to a head of the subject. '408 Patent

30:23-29. *See also* '408 Patent 40:46-51 (similar).

Provided herein is a method comprising adjusting an output of an electric alternating current source for influencing a Q-factor a measure of frequency selectivity of a specified EEG band of a subject toward a target Q-factor of the band; and applying said electric alternating current across a head of the subject. In some embodiments of the methods, a controlled waveform CES therapy is used to influence a Q-factor of an intrinsic frequency of a patient's brain. FIG. 12 shows an example of the Q-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The Q-factor is defined as the ratio of $f_0/\Delta f$. As can be seen, when ΔF decreases for a given f_0, the Q-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases. '408 Patent 47:47-64. *See also* '490 Patent 65:9-26 (similar); '737 Patent 60:1-18 (similar).

FIG. 12 shows an example of the Q-factor as used in this invention. The figure shows a sample graph of the frequency distribution of the energy of an EEG signal. It can be seen that a frequency range, Δf can be defined as the frequency bandwidth for which the energy is above one-half the peak energy. The frequency f_0 is defined as the intrinsic frequency in the specified band. The Q-factor is defined as the ratio of $f_0/\Delta f$. As can be seen, when ΔF decreases for a given f_0, the Q-factor will increase. This can occur when the peak energy E_{max} of the signal increases or when the bandwidth of the EEG signal decreases. '408 Patent 52:49-59. *See also* '490 Patent 70:10-21 (similar); '737 Patent 65:4-13.

Q-factor is being interpreted as the bandwidth about a center frequency. '408 Prosecution History at *658. *See also* '490 Prosecution History at *1625 (stating similar); '737 Prosecution History at *1102 (stating similar).

Also with respect to Claim 1, since Katz is concerned with moving the current brain state to another brain state, Katz fails to teach or suggest "adjusting output of a magnetic field to a setting that is operable to ... influence a Q-factor of the intrinsic frequency toward a target Q-factor." As described and shown in the instant specification (for example at paragraphs [0313], and in Figure 12, at least), a Q-factor is a measure of the distribution around the frequency within a single EEG band. '408 Prosecution History at *737. *See also* '408 Prosecution History at *1746-47 (similar statement); '490 Prosecution History at *1530 (stating similar); '490 Prosecution History at *1804 (stating similar).

Furthermore, an adjustment to the intrinsic frequency would naturally influence the Q-factor of the intrinsic frequency, although in what direction is unknown. '408 Prosecution History at *760.

This focusing of the energy in the band can be quantified by the Q-factor of the Fourier transform. Q-factor represents the ratio of the total energy of a system stored divided by the energy lost in a single oscillation of the system. It can be characterized by the equation for Q depicted in FIG. 12, where f**0** is the alpha frequency and Δf (delta f) is the bandwidth, the width of the range of frequencies for which the system energy is at least half its peak value. FIG. 12 also shows a pictorial example of the elements of Q-factor. In the plot shown in FIG. 12, f**0** is the alpha frequency and Δf (delta f) is the bandwidth at half energy Emax. '490 Patent 35:61-36:4. *See also* '737 Patent 34:30-40.

XVII. "Second" and "Third" intrinsic frequency (Claim Number 27)

In some embodiments, at least one of the intrinsic frequency and the fitted Gaussian curve is used to determine a coherence value of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band. '490 Patent 4:5-8. *See also* '490 Patent 29:1-4 (similar).

In some embodiments, the device is operable to at least one of: influence the intrinsic frequency of the brain of a subject within the specified EEG band; influence a Q-factor of the intrinsic frequency; influence a coherence of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band; and influence an EEG phase between two sites in the brain of a subject of a specified EEG frequency. '490 Patent 5:12-19. *See also* '490 Patent 15:49-56 (similar); '490 Patent 30:9-16 (similar).

In another aspect are methods of treating a subject, comprising: (a) adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value; and (b) applying said magnetic field close to a head of the subject '490 Patent 6:48-53. *See also* '490 Patent 18:21-29 (similar); '490 Patent 31:45-50 (similar).

In another aspect are methods adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected or target coherence value comprising: determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. '490 Patent 6:54-7:3. *See also* '490 Patent 31:51-67 (similar).

In another aspect are devices comprising a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band. '490 Patent 11:9-13.

In some aspects, is a device for use in treating a subject, comprising: a Transcranial Magnetic Stimulation (TMS) device; whereby the means for applying the magnetic field is capable of influencing (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of a brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band; or (d) a combination thereof. Provided herein is a method of treating depression in a subject, comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of the subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex. '490 Patent 17:64-18:12. *See also* '490 Patent 19:12-24 (similar

for treatment of depression); ’490 Patent 37:53-61 (similar); ’490 Patent 38:44-56 (similar); ’490 Patent 39:38-47 (similar); ’490 Patent 40:33-45 (similar).

Provided herein is a system for treating depression comprising: a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing at least one of: (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of the brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in the brain of the subject within a specified EEG band; and (d) a EEG phase between two sites in the brain of the subject of a specified EEG frequency, and a device capable of determining the blood flow of at least one of the cortex and a lower region of the brain. ’490 Patent 20:36-48.

Provided herein is a system for treating depression comprising: a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing at least one of: (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of the brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in the brain of the subject within a specified EEG band; and (d) a EEG phase between two sites in the brain of the subject of a specified EEG frequency, and a device capable of determining the blood flow of at least one of the cortex, a dorsal and frontal region, and a parietal-occipital region of the brain. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex. ’490 Patent 34:16-34.

In some embodiments of a device or devices as described herein, the device is operable to influence an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a Q-factor of an intrinsic frequency of the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a coherence of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band. A device as described herein may be operable to influence a EEG phase of intrinsic frequencies among multiple sites in the brain of a subject within a specified EEG band. ’490 Patent 47:37-48.

Provided herein is a method of treating a subject, comprising adjusting output of a magnetic field for influencing a coherence of intrinsic frequencies among multiple sites in a brain of the subject within a specified EEG band toward a pre-selected coherence value; and applying said magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. ’490 Patent 58:7-15.

Provided herein is a method of improving coherence of intrinsic frequencies within a specified EEG band among multiple locations of a brain of a subject, comprising determining the coherence value of the intrinsic frequencies among multiple locations throughout a scalp of the subject; comparing the coherence value from step (a) to an average coherence value of a healthy population database; if the coherence value from step (a) is higher than the average coherence

value of the healthy population database, lowering the coherence value of the subject by applying at least two asynchronous magnetic fields close to a head of the subject; if the coherence value from step (a) is lower than the average coherence value of the healthy population database, raising the coherence value of the subject by applying at least one synchronized magnetic field close to a head of the subject. In some embodiments, a NEST device, such as one of the NEST devices (pMERT devices) described herein is used to create the magnetic field of the method. '490 Patent 58:56-59:6.

12. (Currently Amended) A system for treating depression in a subject comprising: a magnetic field generator adapted to apply a magnetic field to a head of the subject, wherein the magnetic field generator comprises:
a)
information comprising
i) a first intrinsic frequency of a brain of the subject within a specified
EEG band,
ii) a O-factor of the intrinsic frequency,
iii) a coherence value of a second intrinsic frequency and a third intrinsic frequency, wherein the second and third intrinsic frequencies are from two different sites in the brain of the subject within the specified EEG band, or
iv) an EEG phase between two sites in the brain of the subject of a specified EEG frequency, wherein the two sites are different. '490 Prosecution History at *1799.

XVIII. Wherein the magnetic field increases the blood flow of a cortex of the brain or decreases the blood flow of a lower region of the brain (Claim Number 28)

"applying said magnetic field close to a head of the Subject and thereby increasing blood flow in the cortex. In some embodiments, the blood flow increase is in the frontal cortex." '490 Patent, 18:10-12; see also '490 Patent, 18:18-20; '490 Patent 18:27-29; 18:34-37; '490 Patent, 37:41-44; '490 Patent, 37:49-52; '490 Patent, 37:58-61; '490 Patent, 37:66-38:2.

"Provided herein is a method of treating depression in a Subject, comprising tuning down the Q-factor of an intrinsic frequency of the Subject by applying a magnetic field close to a head of the subject thereby increasing blood flow in the cortex, wherein the magnetic field comprises at least one of (a) a single pre-selected frequency; (b) a plurality of frequencies within a specified EEG band; and (c) an intrinsic frequency of a brain of the subject within a specified EEG band.In some embodiments, the blood flow increase is in the frontal COrteX." '490 Patent, 18:38-47; see also '490 Patent, 19:12-24; '490 Patent, 19:55-65; '490 Patent, 38:3-12; '490 Patent, 38:44-56; '490 Patent, 39:57-67; '490 Patent, 40:32-45.

"FIG.37 shows a general relationship between the measures of neural activity in the cortex and a possible indication for major Depressive Disorder (MDD)." '490 Patent, 24:4-6.

"Increased neuronal activity in a region of the brain is associated with an increase in blood flow, and hence a higher rate of oxygenated/deoxygenated hemoglobin as measured by Blood Oxygenation Level Detection (BOLD). In Major Depressive Disorder ("MDD" and/or shortened herein in some embodiments as "depression"), there is a significant decrease in blood flow, and therefore a decrease in metabolic activity in the cortex. In some embodiments, the blood flow increase (and or increase in metabolic activity) is in the frontal cortex. This can be shown in studies using SPECT and PET scans. The lower the blood flow to the cortex, the greater the severity of the depression. This decreased blood flow becomes more significant for subjects with

increased cognitive impairment associated with their depression. The decrease in regional cerebral blood flow (rCBF) is particularly evident in the prefrontal cortex and cingulated gyrus. Studies of correlations between rCBF and symptom severity in MDD show a decrease in metabolism in the amygdale, lentiform nucleus, parahippocampal gyrus, and an increase in metabolism in the postero-lateral parietal cortex. Other studies have shown an increase in blood flow in the lower regions of the brain during MDD, such as the cerebellum and amygdala for depressed subjects. The metabolism of a region of the brain can be related to the energy consumed by that region. An area of high metabolism may be considered an area of high energy or high activity. Likewise, an area of low metabolism may be considered an area of low energy." '490 Patent, 32:23-49.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing at least one of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and a O-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected O-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject, and wherein the pre-selected O-factor is a O-factor that increases blood flow in the cortex of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that increases blood flow in the cortex of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing a O-factor of an intrinsic frequency within a specified EEG band of a subject toward a pre-selected O-factor and applying said magnetic field close to a head of the subject; wherein the pre-selected O-factor is a O-factor that increases blood flow in the dorsal and frontal regions of the cortex of the subject. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex." '490 Patent, 32:50-33:10.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a lower region of the brain of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing a O-factor of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected O-factor; and applying said magnetic field close to a head of the subject; wherein the pre-selected O-factor is a O-factor that decreases blood flow in a parietal-occipital region of the brain of the subject. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulated gyrus, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia." '490 Patent, 33:11-28.

"Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing an intrinsic frequency of a specified EEG band of a subject toward a pre-selected intrinsic frequency of the specified EEG band; and applying said magnetic field close to a head of the subject; wherein the pre-selected intrinsic frequency is a frequency that decreases blood flow in a rear region of the brain of the subject. Provided herein is a method for treating depression comprising: adjusting output of a magnetic field for influencing a O-factor of an intrinsic frequency of a specified EEG band of a subject toward a pre-selected O-factor; and applying said magnetic field close to a head of the subject; wherein the pre-selected O-factor is a O-factor that decreases blood flow in a parietal-occipital region of the brain of the subject. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia." '490

Patent, 33:29-46.

"Provided herein is a system for treating depression comprising: a means for applying a magnetic field to a head of a subject; whereby the means for applying the magnetic field is capable of influencing at least one of: (a) an intrinsic frequency of a brain of the subject within a specified EEG band; (b) a Q-factor of an intrinsic frequency of the brain of the subject within a specified EEG band; (c) a coherence of intrinsic frequencies among multiple sites in the brain of the subject within a specified EEG band; and (d) a EEG phase between two sites in the brain of the subject of a specified EEG frequency, and a device capable of determining the blood flow of at least one of the cortex, a dorsal and frontal region, and a parietal-occipital region of the brain. In some embodiments, the parietal-occipital region comprises at least one of the anterior cingulate, anterior temporal lobe, parietal lobe, occipital lobe, limbic system, and basal ganglia. In some embodiments, the dorsal and frontal region comprises at least one of the orbital frontal cortex, prefrontal tip, and dorsal lateral prefrontal cortex." '490 Patent, 34:16-34.

"The Q-factor of the EEG waveform can be represented by fitting a Gaussian-shaped curve to the frequency plot, as shown in FIG. 36a, and FIG. 36b (having a measure of energy shown on the y-axes of these plots, and frequency in Hertz shown on the x-axis of these plots). In this, Afis defined as the bandwidth at 0.7071 of the maximum amplitude, because the energy of a system is proportional to the square of the Fourier transform. The high-Q EEG has significantly more resonance, and therefore less energy consumption, than the low-Q EEG. It can be stated, therefore, that the region of cortex underneath the electrode requires less energy, and therefore has a lower metabolism, for the high-Q patient than the low-Q patient." '490 Patent, 36:12-24.

"The power of the alpha band relative to other bands is generally higher for patients with MDD. Since the overall metabolism of the brain is generally constant, the increase in alpha power will result in a higher alpha Q-factor, which indicates a lower metabolism, and energy, of the cortex. Patients with MDD usually have lower metabolism in the cortex, especially in the frontal regions, therefore the Q-factor of alpha EEG in those regions will be high, indicative of a low-energy system. FIG. 37 shows a general relationship between the measures of neural activity in the cortex and a possible indication for Major Depressive Disorder (MDD)." '490 Patent, 36:39-49.

"applying said magnetic field close to a head of the Subject and thereby increasing energy in the cortex and/or metabolism of the cortex. In some embodiments, the blood flow increase and/or the increased metabolism is in the frontal cortex." '490 Patent, 39:24-28; '490 Patent, 39:33-37; '490 Patent, 39:43-47; '490 Patent, 39:52-56;

"The regional Cerebral Blood Flow (rCBF) of subjects enrolled at the US study site was evaluated using a SPECT scan at baseline and again after the 4 weeks of treatment. A significant correlation between changes in rCBF and HAMD-17 score was found, specifically in the orbital frontal cortex (r=−0.67, P=0.04), prefrontal tip (r=−0.66, P=0.05), and dorsal lateral prefrontal cortex (r=−0.55, P=0.12). See Table 5 showing the correlation between Changes in rCBF (%) and HAMD Score (%). Areas of increased activation of the active NEST device compared to sham were observed, along with areas of deactivation of the active NEST device compared to SHAM. Areas of the cortex were observed to be activated by NEST device treatment compared to SHAM. Areas of the cortex were observed to be deactivated by NEST device compared to SHAM. A significant portion of the cortex was shown to have increased blood flow for the active subjects (using the NEST device) compared to sham. Much of this activation occurs in the prefrontal cortex. Using the therapy, activation of the cortex occurs, especially in the frontal region, whereas deactivation occurs in the rear and lower regions of the brain."

"In this study, a large, statistically significant decrease in HAMD score was observed in subjects treated with the NEST device. This improvement in symptoms of depression was accompanied

by a significant decrease in Q-factor in the cortex. In addition, in subjects treated with the active NEST device, there was an increase in blood flow, and therefore an increase in metabolism in the cortex, particularly in the prefrontal region, the area of the brain associated with mood. FIG. 42 shows how the increase in rCBF in orbital frontal cortex predicts clinical improvement in depression (r=−0.67, P=0.04). This figure shows that as the blood flow in the orbital frontal cortex is increased, the HAMD score decreases." '490 Patent, 82:35-83:21.

"and wherein the magnetic field increases the blood flow of cortex of the brain or decreases the blood flow of a lower region of the brain ~~and a device capable of determining the blood flow of at least one of the cortex and a lower region of the brain~~." '490 Prosecution History at *1526 (March 19, 2014 Response to Office Action, p. 4).

"Additionally, neither Katz nor Souder disclose or suggest comprising a magnetic field generator adapted to apply a magnetic field to a head of a subject wherein the magnetic field is configured to increase the blood flow of at least one of the cortex and a lower region of the brain." '490 Prosecution History at *1755 (June 9, 2014 Response to Final Office Action, p. 8).

"Additionally, neither Katz nor Souder disclose or suggest comprising a magnetic field generator adapted to apply a magnetic field to a head of a subject, wherein the magnetic field generator comprises information and a processor that controls the magnetic field and wherein the magnetic field is configured to increase the blood flow of at least a cortex of the brain or decrease the blood flow of a lower region of the brain." '490 Prosecution History at *1805 (July 7, 2014 Response to Final Office Action, p. 8).

"wherein the magnetic field increases the blood flow of a cortex of the brain or decreases the blood flow of a lower region of the brain." '490 Prosecution History at *1800 (July 7, 2014 Response to Final Office Action, p. 3).